A COMPREHENSIVE STUDY ON CLOSED RHINOPLASTY

Dissertation submitted for
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BRANCH IV

(OTO-RHINO-LARYNGOLOGY)
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CHENNAI
TAMIL NADU

CERTIFICATE

This is to certify that this dissertation titled **"**A COMPREHENSIVE STUDY ON CLOSED RHINOPLASTY **"** submitted by **DR.D.PRINCE PETER DHAS** to the faculty of ENT, The TamilNadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of MS degree Branch IV ENT, is a bonafide research work carried out by him under our direct supervision and guidance from August 2009 to September 2011.

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I wish to record my sincere respect & thanks to all those patients who despite their agony & suffering have helped me in moulding this study.

Place:

Date :

DECLARATION

I hereby solemnly declare that the dissertation titled **"A COMPREHENSIVE STUDY ON CLOSED RHINOPLASTY"** has been prepared by me under the guidance & supervision of **Dr.K.R.KANNAPPAN MS, DLO, M.Ch,** Professor & Head of Department of OTORHINOLARYNGOLOGY**, ,** Govt Rajaji Hospital, Madurai. This is submitted to **The TamilNadu Dr. M.G.R. Medical University, Chennai,** in partial fulfillment of the regulations for the award of MS degree (Branch IV) in OTOLRHINOLARYNGOLOGY.

Place: Madurai

Date: **SIGNATURE**

CONTENTS

ABSTRACT:

Although many surgical techniques have been introduced, there are few clinical studies investigating postoperative results in nasal deformities. The aim of this study is to discuss the surgical choices for specific deformities and to report the long-term quantitative surgical results of our cases.

25 patients who attended ENT department, Govt. Rajaji Hospital, Madurai from August 2010 to September 2011 were included in this study. Our series includes various deformities such as crooked nose, saddle nose , hump nose & tip deformities. All these deformities were corrected by closed rhinoplasty or combined with external approach when tip plasty is needed. We have analysed the results using pre-operative & post-operative photographs taken in frontal, basal and lateral views. The results were excellent in 45.5% of patients with crooked nose, 54.5% of patients with saddle nose & 66.6% with hump nose. These results are as better as those cases done by open approach but advantageous than it by avoiding external scars & thereby psychologically satisfying the patients.

Key words: ‘Closed rhinoplasty’, ‘Deformity’, ‘Aesthetics’, ‘Crooked’, ‘Saddle’, ‘Hump’, ‘Augmentation’, ‘Osteotomy’, ‘photographs’,

INTRODUCTION

'Aesthetics' is a term derived from 'Aisthesthai' (Greek) meaning 'To Sense'.

Alexander Baumgarten (1750) refer it to an enquiry into sensation or perception.

Immanuel Kant postulated that Aesthetics should be an independent enquiry into subjective experience of beauty & aesthetic pleasure.

An understanding of Facial aesthetics is a prerequisite prior to any Facial procedure.

Five major components that contribute to Facial complex are

1) Forehead
2) Nose
3) Eyes
4) Lips
5) Chin

'NOSE' a link between ear & throat is not only of great importance to both but apparently the most ancient of the medical specialists. It is the prominent organ of face which carries great emotional & social significance. In ancient literature nose has been used to represent Man's character & behavior.

Cleopatra’s beauty was represented by her nose.

Nowadays the demand for ‘Cosmetic Rhinoplasty’ is increasing owing to social pressures & changing attitudes.

Surgery of external nose which was frequently performed by Plastic surgeons has now become a part of ENT Surgeons.

Rhinoplasty Surgery is not universal & it should be customized for each patient depending on his/her needs.

HISTORICAL REVIEW

It is our pride that the origin of Rhinoplasty procedures was our Ancient India.

First description of nasal reconstruction is mentioned in the Encyclopedic work of Susruta in 'Susruta Samhita' in 6th century BC.

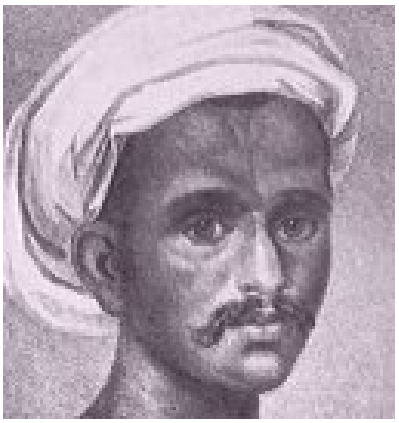
Susruta had also mentioned the use of Facial flaps in nose reconstruction. Many pioneers like Hippocrates, Galen, Rhazes & Arabic physicians have made frequent references to Susruta.

Manucci Niccolao- a Viennese physician lived in India between 1652 – 1708 AD gave an account of reconstruction of nose by Indian physicians in his gigantic work entitled ‘Storia de Major’

The first description of a case of forehead Rhinoplasty appeared in Madras Gazette 1793.

In the Mysore war of 1792 a maharatha , Cowasjee was captured by Tipu Sultan’s soldiers & his nose was cut off.

His nose was reconstructed by using a forehead flap by a maharatha potter in 1793. This sensational surgery was published in Gentleman’s Magazine & Historical Chronicle published in London IN 1794 under the title of “Curious Chirugical Operation –NEW NOSE”



Kangra district of Himachal Pradhesh had been considered once a home of Plastic surgeons. The French traveller G.T.Vigne who visited India in 1833 -1839 had described the Kangra nasal plastic surgery in his travellogue.

1869- Dr.Tribowandar Motichand Shah , Chief Medical Officer from state of Junagadh wrote a monograph on Rhinoplasty based on his experience of 100 cases of reconstructive Rhinoplasty performed within 5 years.

The art of reconstructive surgery of disfigured nose , ears , cheek & lips had been popular in India till 18th century. Thereafter this knowledge found its way to London & Europe.

The Italian method described by 'Caspare Tagliacozzi' (1545-1599) in Italy consisted of reconstruction of nose by use of a tubed flap from the arm.

French method basically consisted of making the nose using bilateral facial flaps.

The two methods Italian & Indian methods remain as useful procedures even today.

Caspue was the first English surgeon to perform Indian Rhinoplasty in 1814 in London.

Van Graefe in 1816 & Dieffenbach in 1829 introduced it in Germany.

Listrane (1827) & Warren (1837) introduced it in France & United States respectively.

Era of corrective rhinoplasty began in 1887 when John Orlando Roe an Otolaryngologist from Newyork described intranasal operation confined to tip.

Robert Weir in 1892 corrected nasal deformities by endonasal approach. He excised a wedge from ala to reduce nasal base.

JACQUES JOSEPH- Father of modern corrective rhinoplasty.

He was basically an orthopaedic surgeon. He elaborated the rhinoplastic techniques & published his book on Rhinoplastic surgery in 1928. And also he designed many instruments for rhinoplasty.

He was followed by Aufrict & Safian who had worked with Joseph. Later many surgeons (Miller, Goldman…) contributed their works in cosmetic nasal surgeries.

AIMS

1) To study in detail the various external nasal deformities & the rhinoplasty procedures that vary with the deformity of each individual.

2) To analyse the postoperative outcome of various closed rhinoplasty techniques.

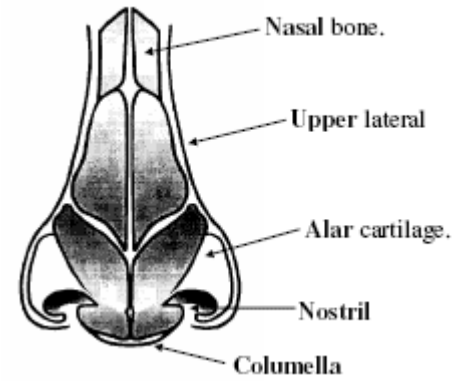
3) To analyse the difficulties with various procedures & the need for a combined approach to have a good aesthetic outcome.

4) To analyse efficiency of autologous grafts in augmentation of dorsum.

ANATOMY OF EXTERNAL NOSE

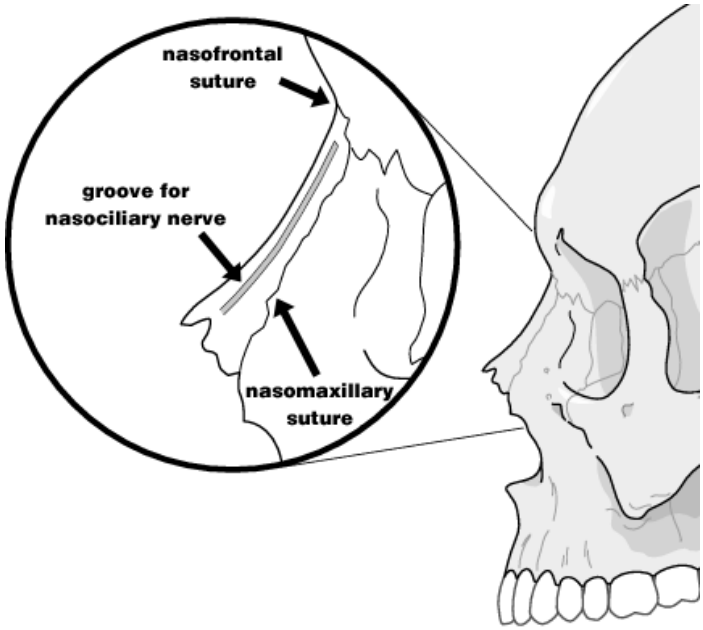
Anatomically external nose is divided into 3 parts

1. Bony pyramid
2. Upper cartilaginous vault
3. Lower cartilaginous vault



Bony Pyramid :

It forms upper 1/3 of nose. Formed by the paired nasal bones & frontal processes of both maxilla.



Nasal bones:

They are paired & articulates with each other in midline along the dorsum of nose.

Superiorly articulates with the nasal process of frontal bone at the nasofrontal suture line.

Laterally with the frontal process of maxilla at nasomaxillary suture line.

Inferiorly it is related to the upper lateral cartilage.

Each nasal bone is tapered , thin & beveled below & thick above.

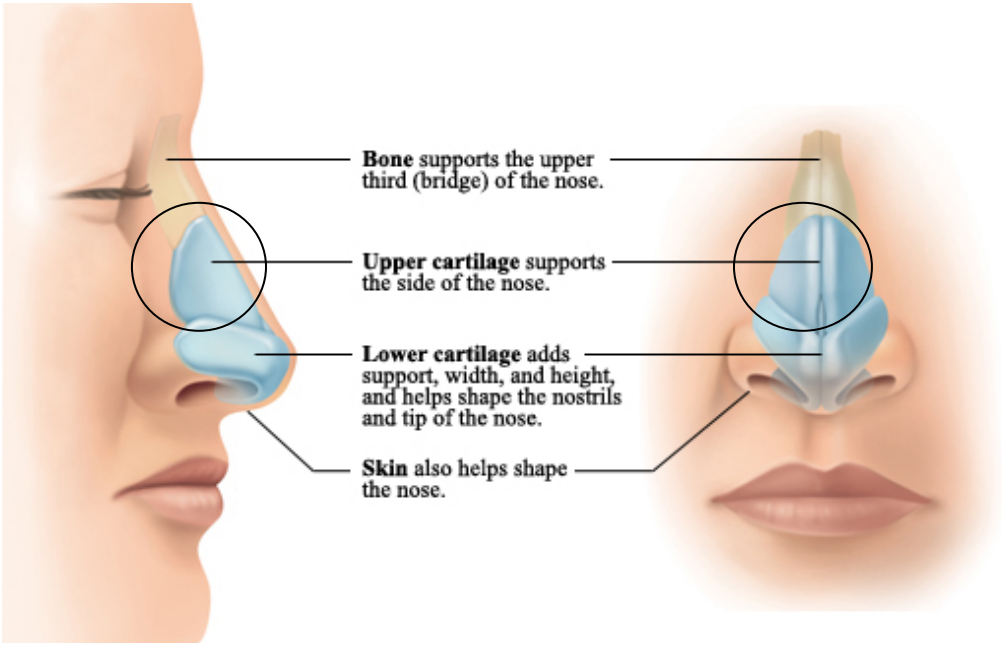
Frontal process of maxilla:

The frontal process of maxilla extend from the pyriform aperture to the anterior lacrimal crest & unite with frontal bone at frontomaxillary suture line.

It is thick below & thin above.

Nasofacial groove is formed by frontal process of maxilla & its anterior surface. It is referred to as **'Nasojugal line or angle'**

Upper cartilaginous vault:



The upper cartilaginous vault is formed by semirigid upper lateral cartilages & a part of cartilaginous septum which are enclosed in a common perichondrial sheath.

Upper lateral cartilage:

They are paired triangular cartilages.

The upper margins are united under the lower beveled edges of nasal bones & frontal process of maxilla with connective tissue.

The perichondrium of upper lateral cartilage & periosteum of nasal bones are fused. So, any motion in nasal bones will be transmitted to these cartilages.

The medial border is thick and are continuous with dorsal border of septal angle.

Inferiorly it is rolled out & upwards to form a scroll.

Lower cartilaginous vault:

It is formed by the paired lower lateral cartilages (alar cartilages).they contribute to the formation of lobule & columella.

Lobule- formed by lateral crurae & domes of lower lateral cartilages.

It is bounded by supratip depression superiorly & the depression between lateral crus & alar prominence laterally.

Tip- formed by domes of the cartilages & is the most anterior part of lobule.

Lower lateral cartilages:

Each is made of a single piece of cartilage.

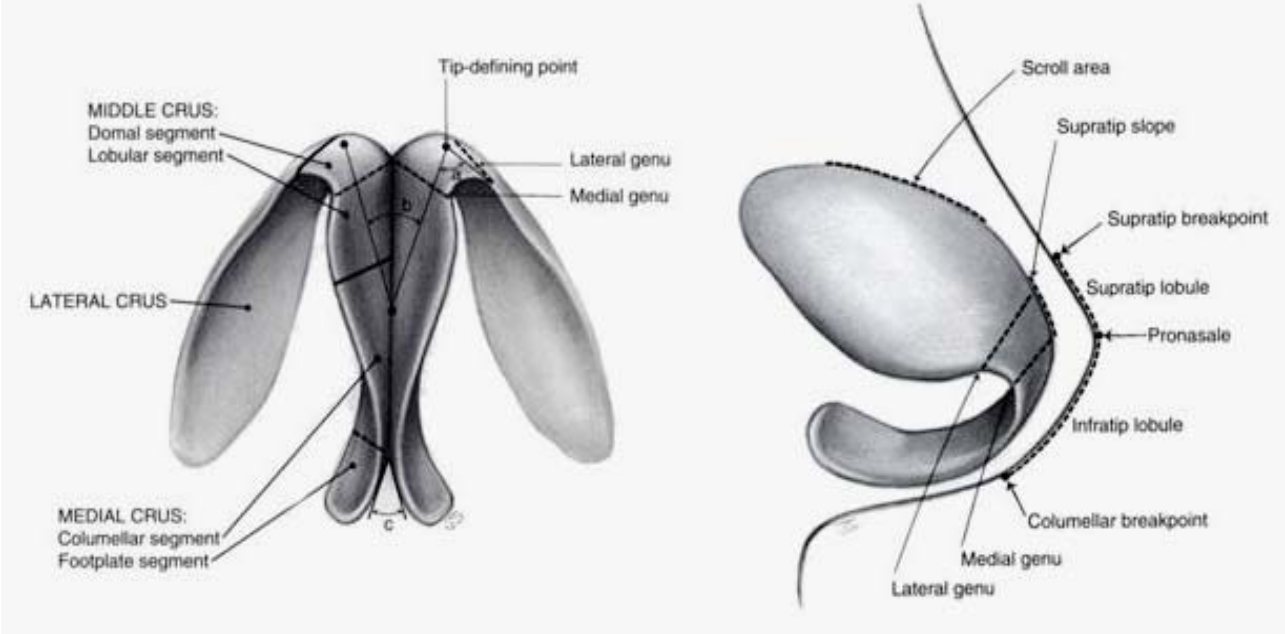
Each consists of

a) Medial crus

b) Lateral crus

c) Dome

ALAR CARTILAGES



Two medial crurae are attached to each other by fibrous tissue & to the lower end of septum by membranous septum.

The medial crurae rests on fatty tissue at the base of columella which tends to atrophy after surgery & undergoes physiological absorption with age resulting in drooping of nasal tip.

The lateral crus forms the contour of the alae.

Upper edge of lateral crus forms a scroll which overlaps the lower end of upper lateral cartilage which is directed inwards & downwards.

The caudal margin of lateral crus has a convex edge whose maximum convexity is close to alar margin.

Lateral crus extends laterally towards the pyriform edge of frontal process of maxilla & it may attach directly to bony edge or its perichondrium attaches to the periosteum of pyriform edge.

ANDERSON has compared the lower lateral cartilage to a tripod.

BERNSTEIN has described the dome in three ways.

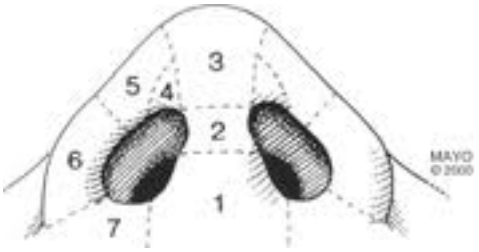
a) Anatomical dome: Site of junction of medial & lateral crurae & forms a well defined bend.

b) Clinical dome: Identical to anatomical dome most of the times but in thin skin individuals especially in females it is apparent.

c) Surgical dome: The dome that is reproduced at the time of surgery.

Columella :

Extends between upper lip & tip of nose. It forms a gentle & graceful curve with a break & slight convexity such that it is visible slightly below the level of nostril border in profile view.



1) Columellar base , 2)Central columella, 3)Sublobular triangle

It is formed by the medial crurae of lower lateral cartilages & fibrofatty tissue. Anteriorly both the medial crurae diverge outwards to form an angle of about 30 degree.

The beauty of columella depends on the size & shape of medial crurae.

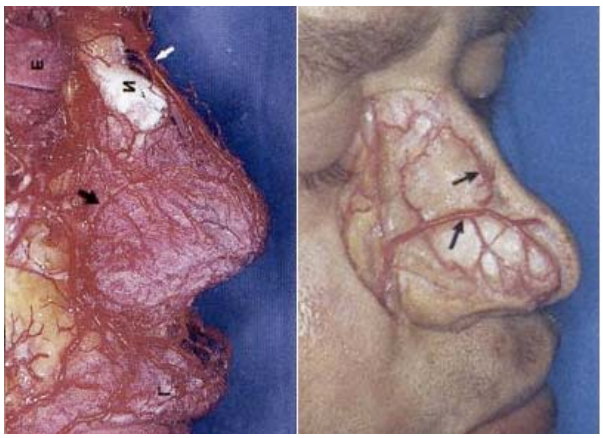
Nasal skin:

Thick at nasion & progressively thins towards rhinion. Again thickens at supratip region. It is thin over the lobule & columella . The skin over the alae is thick & firmly attached to the underlying cartilage. This plays an important role in assessing the deformities of tip & alae of nose and planning the surgery.

Muscles:

1. Depressor nasal septi
2. Nasalis
3. Procerus
4. Levator labii superioris alaeque nasi

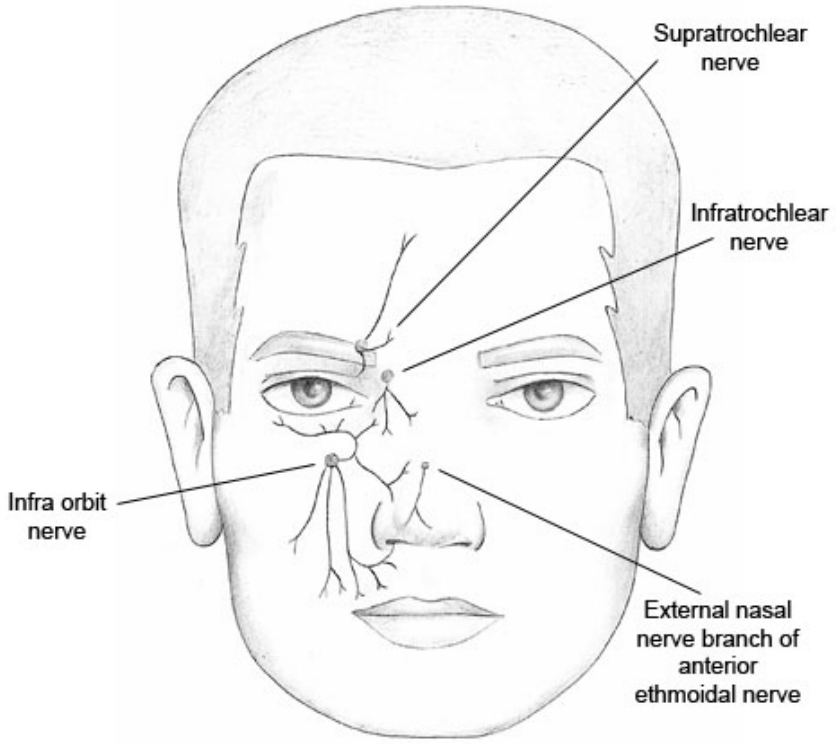
Blood supply of external nose:



1. Columellar branch of superior labial artery,
2. Lateral nasal & angular branches of facial artery,
3. Infraorbital branch of maxillary artery,
4. Dorsal & External nasal branches of ophthalmic artery.

Corresponding veins drain into the angular & ophthalmic veins.

Nerve supply:



From ophthalmic & maxillary division of trigeminal nerve through

1) Infraorbital nerve
2) Infratrochlear nerve
3) External nasal nerve
4) Terminal filaments of palatine nerve

Nasal septum:

Bony & cartilaginous components

1) Quadrilateral cartilage
2) Perpendicular plate of ethmoid
3) Vomer
4) Rostrum of sphenoid
5) Anterior nasal spine
6) Maxillary crest
7) Nasal spine of frontal bone

If the septum is injured , deviated or depressed the cartilaginous dorsum is also deviated or depressed accordingly.

There is a saying that 'THE NOSE GOES WHERE THE SEPTUM GOES'

Membranous septum:

It lies between the septal cartilage & columella. It consists of vestibular skin with intervening areolar tissue.

Vestibule:

It is the lower most part of nasal fossa limited superiorly by caudal edge of upper lateral cartilages.

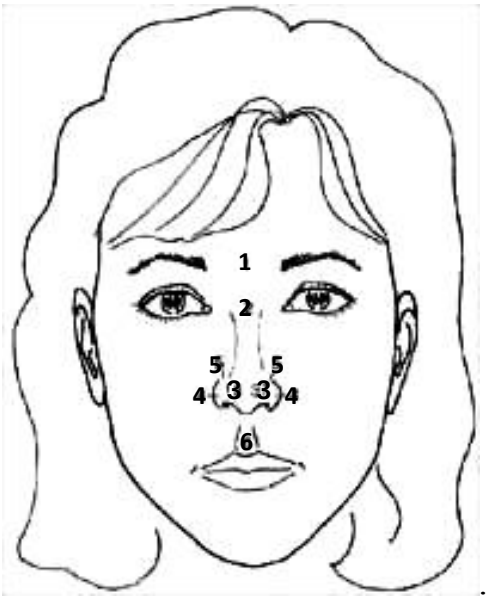
Internal nasal valve:

It is a triangular area bounded by

1) Caudal edge of upper lateral cartilage
2) Nasal septum
3) Anterior end of inferior turbinate
4) Nasal floor

SURGICAL LANDMARKS & THEIR SIGNIFICANCE

Frontal view:



1, Glabella;

2, nasion;

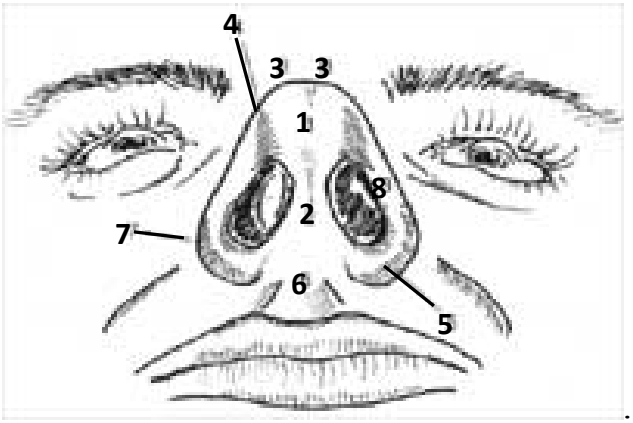
3, tip-defining points;

4, alar-sidewall;

5, supraalar crease;

6, philtrum.

Base:



1, Infratip lobule;

2, columella;

3, tip-defining points

4, facet or soft-tissue triangle;

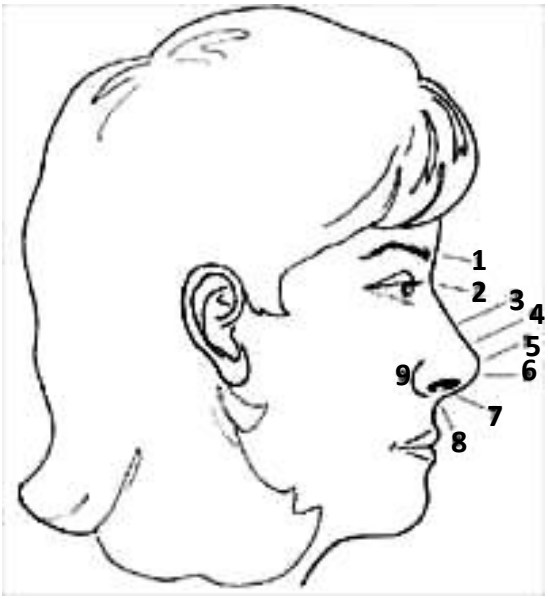
5, nostril sill;

6, columella-labial angle or junction;

7, alar-facial groove or junction;

8, alar sidewall

Lateral view:



1, Glabella; 2, nasion, nasofrontal angle;

3, rhinion (osseocartilaginous junction); 4, supratip;

5, tip-defining points; 6, infratip lobule;

7, columella; 8, columella-labial angle or junction;

9, alar-facial groove or junction.

Oblique:

1, Glabella;

2, nasion, nasofrontal angle;

3, rhinion;

4, alar sidewall;

5, alar-facial groove or junction;

6, supratip;

7, tip-defining points;

8, philtrum.

1. Glabella: Smooth, bony, triangular area on frontal bone between the Supraorbital Ridges.

2. Radix nasi: upper part of nose formed by articulation of nasal bones & frontal process of maxilla with the nasal spine of frontal bone.

3. Nasion: The junction of upper end of suture between nasal bones with frontal bone.

4. Rhinion: The lower end of suture between nasal bones.

5. Dorsum nasi: The portion of nose that extends between the nasion & nasal tip.

6. Nasal bridge: The bony part of dorsum nasi.

7. Lobule: The portion that is formed by domes & lateral crurae of both Lower lateral cartilages.

8. Dome: The dorsal portion of lobule between medial & lateral crurae.

9. Tip: This is represented by domes of both sides.

10. Limen nasi/vestibule: The junction between upper & lower lateral cartilages. Intercartilagenous incision is placed here.

11. Soft triangle: Area of lobule between external & vestibular skin, inferior to dome. It is devoid of cartilage. This is more prominent in females.

12. Weak triangle: Connective tissue aponeurosis between septal cartilage & Upper lateral cartilage border above septal angle.

13. Subnasale: Point at the nasal spine where nasal septum merges with the Upper lip in mid-sagittal plane.

14. Gnathion: Lowest point of chin in midline.

15. Septal angles: The junction of dorsal & caudal border of septal cartilage is called anterior septal angle.

The junction of inferior & caudal border of septal cartilage is called posterior septal angle.

16. Empty triangle: The upper lateral cartilages do not extend laterally to the pyriform aperture & leave a space to be filled by fibrofatty tissue.

17. 'K' area : Junction between lower end of nasal bones, upper lateral Cartilages, septal cartilage & vertical plate of ethmoid bone.

It is the centre of support for nasal roof.

18. Nasolabial crease: Crease or groove along the attachment of ala with the Upper lip.

19. Nasoalar crease: Continuity of nasolabial crease superiorly & medially Above the cephalic border of lateral crus of alar cartilage.

SURGICAL PHYSIOLOGY

A Rhinologic surgeon should be familiar with applied function of nose & the mechanism of airway resistance.

The most important function is to supply adequate amount of filtered & humidified air & provide optimum resistance to lower respiratory tract.

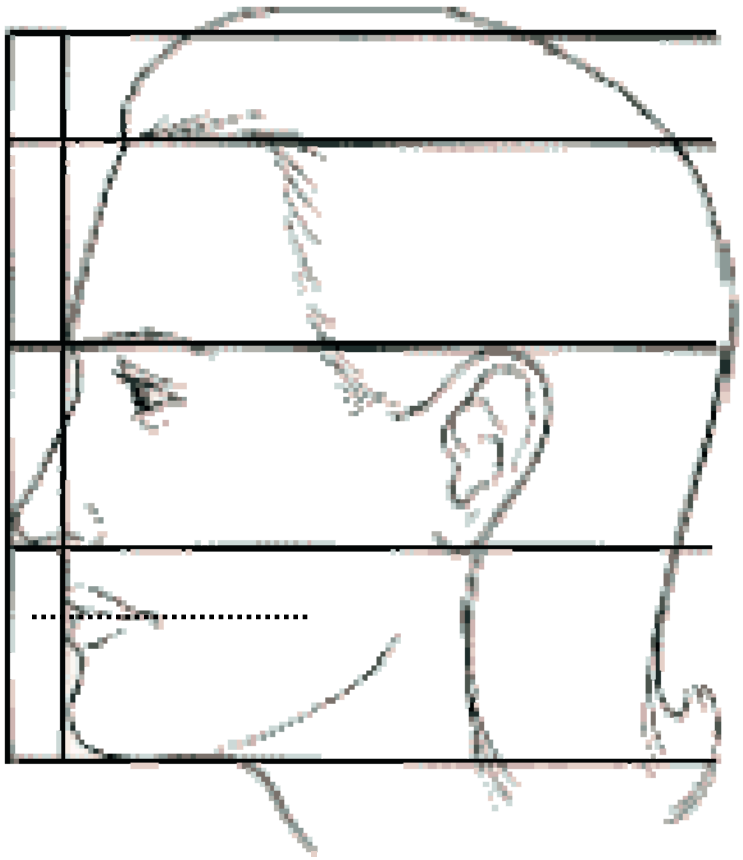
The shape of nose, the direction of anterior nares & degree of nasolabial angle plays an important role in directing the airway & altering the resistance.

AESTHETIC ANALYSIS OF NOSE

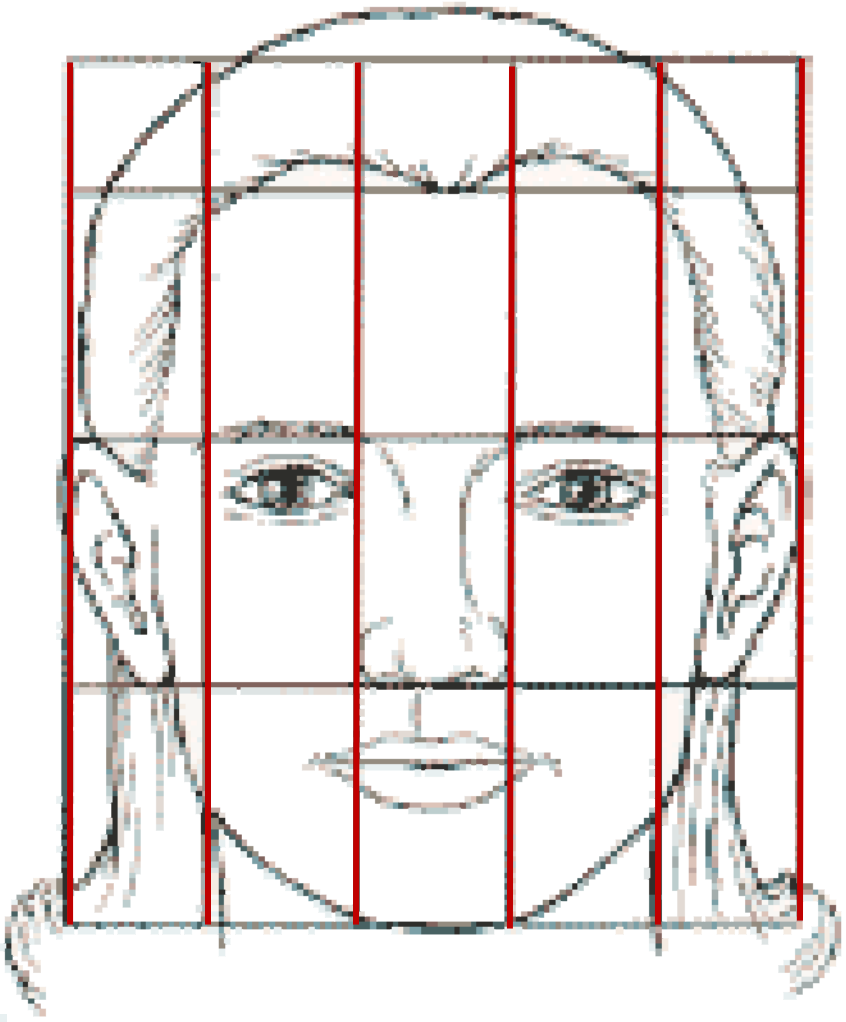
Face is divided into thirds by transverse lines:

- At mentum. (gnathion)
- Subnasale.
- Glabella
- Hairline (Trichion)

Lower third is further divided by the line at the oral commisures



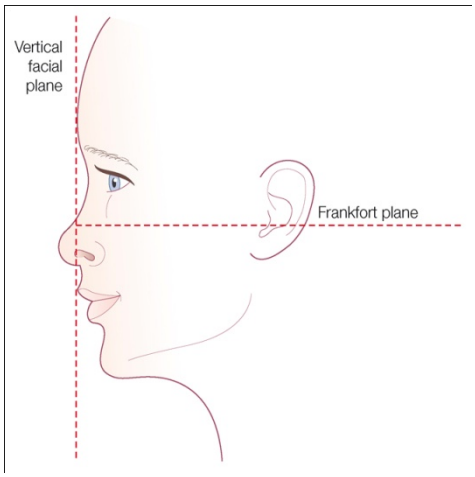
The width of the face divided into equal fifths



This pattern of facial dimensions was described by Leonardo da Vinci.

Frankfort plane:

A horizontal line along the inferior border of the infraorbital rim and the superior border of the external auditory canal.



The vertical facial plane:

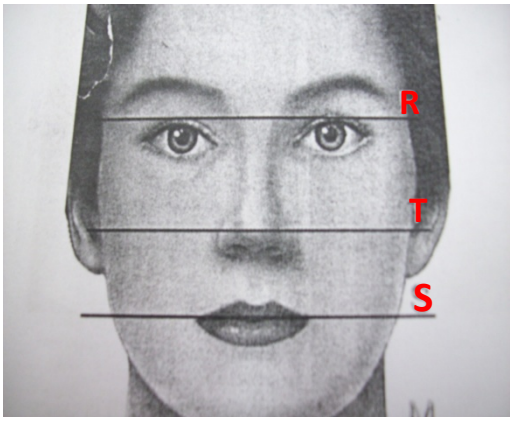
A line drawn at 90 degree to the frankfort plane and the forehead upper lip and chin should lie on or within a few millimetres of this plane.

Frontal view

Nasal length (as per Byrd)

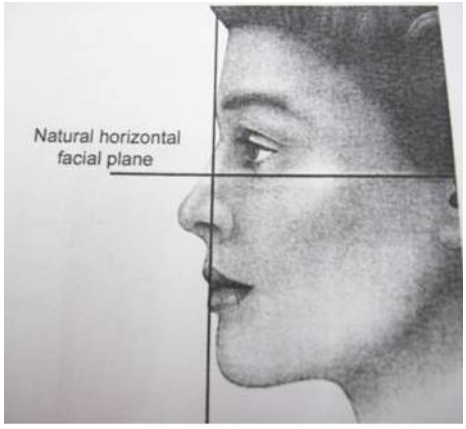
R-T =STOMION TO MENTON(S-M) =1.6 x T-S.

Distance of dorsum from medial canthus at root = 1.5 cm



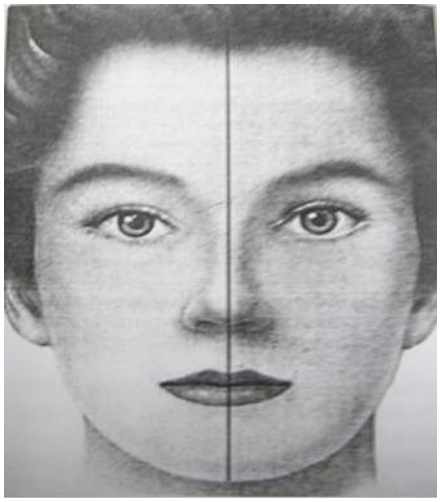
NATURAL HORIZONTAL FACIAL PLANE:

A line perpendicular to the plumb line when the head at rest and eyes at forward gaze.



MID VERTICAL LINE:

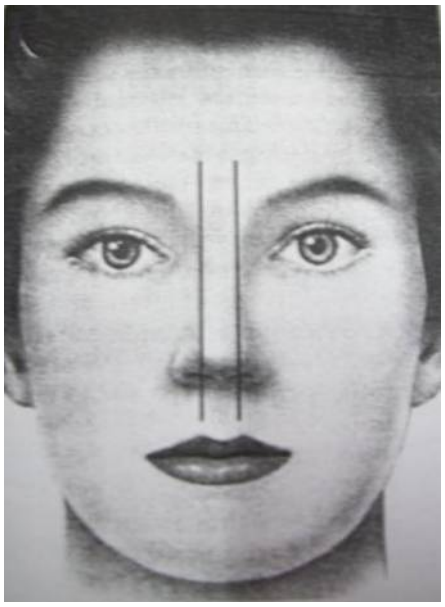
A line drawn from the midglabella to the menton passing between the two central incisors.



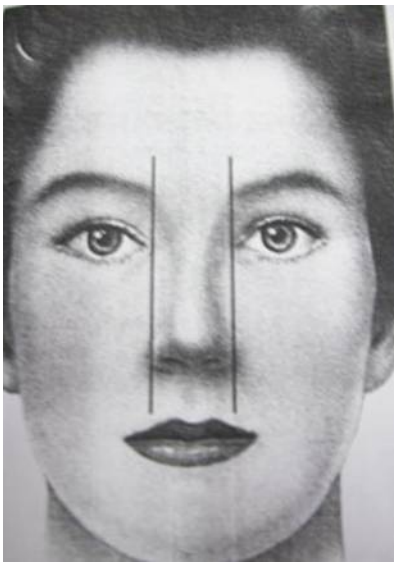
NASAL DORSUM:

Outlined by two slightly curved lines from the medial superciliary ridges to the tip defining points.

The **WIDTH OF THE BONY BASE** is 70% -80% of the normal alar base.



The **WIDTH OF THE ALAR BASE** is the same as the intercanthal distance.



LATERAL VIEW

On lateral view of the nose, the outline of the nostril has an oval shape.

Upper half formed by the alar rim,

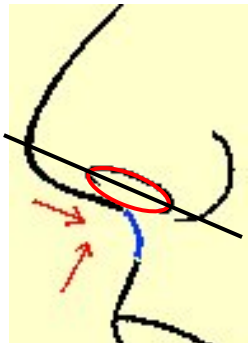
Lower half formed by the columellar rim.

By studying the distance between the alar and the columellar rim from the long axis, divided into 6 types:

Hanging ala

Hanging columella

Hanging ala and columella



Retracted ala

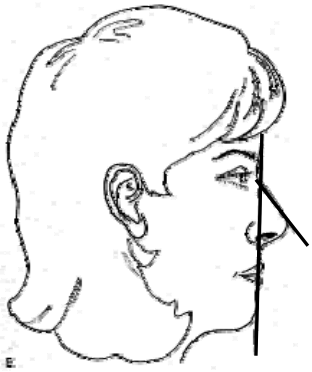
Retracted columella

Retracted ala and columella

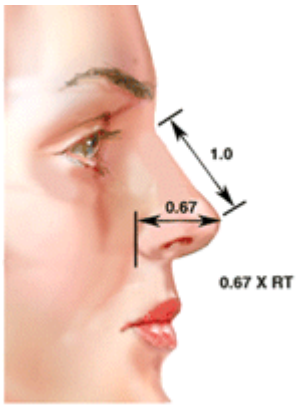
Nasofrontal angle = 120 □

Nasolabial angle =90 □

Angle of nasal projection =30 □

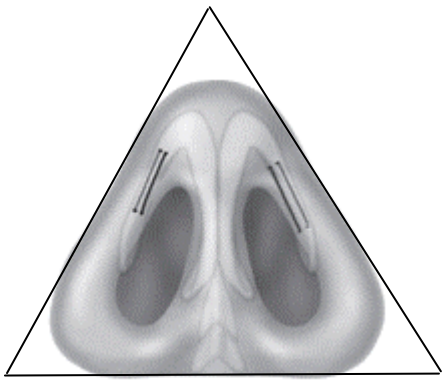


The ratio of the nasal length to the tip projection 1.0:0.67.



Basal view

The outline of the nasal base is an equilateral triangle.



REVIEW OF LITERATURE

The history of rhinoplasty surgeries are very old. The evolution of rhinoplasty began with reconstructive rhinoplasty in 6th century BC.

It has crossed various stages like reconstructive rhinoplasty, corrective rhinoplasty & cosmetic rhinoplasty. The approach used by most of the aesthetic surgeons in past was an open approach. But now most of surgeons seek to learn closed approach in order to fulfill the attitude of patients.[35]

Closed rhinoplasty is not for everyone to learn, only those deemed ready for it can begin to undertake it. Because it need a long apprenticeship.

Sam fomon who was reported to have done over 15,000 rhinoplasties states that ‘ Fine art of rhinoplasty requires a long apprenticeship, it takes a long time to train a student’s eyes for what to look & his finger for what to feel, And to digest, assimilate & give meaning to his sense perception.[32]

John . O . Roe, an American ENT surgeon was the first to introduce intranasal approach of rhinoplasty in 1887 by applying an incision between upper lateral cartilage & nasal bones.[35]

In 2006 Philip J. Miller & Anil R.Shah had shown that the advantages of shorter operative time, less prolonged post operative swelling & less

post operative contracture make endonasal rhinoplasty to continue to save a prominent role in addressing nasal deformities.[35]

John Roe did his first saddle nose in a woman which was of traumatic aetiology by insertion of metal spring prosthesis.[35]

Robert weir in 1892 used heterogenous sternum of a freshly sacrificed duck to augment a nose sunken from syphilis.

Weir wrote : A perfect restoration must be accomplished at the time of operation & it must be capable of being maintained without force, retention pads or apparatus. Further improvement must not be hoped for by the use of plugging of iodoform gauze or other materials introduced into nostril.[35]

Skoog , in 1952 removed a large hump in a single piece & replaced it after trimming & reshaping. He explained that it was suitable for large hump particularly when associated with crooked nose deformity.

In 1947 Maurice. H .Cottle endonasally resolved a septal deviation with a transfixion incision which conserved the septum. Thus he advocated the practical primacy for closed rhinoplasty.[35]

In 1968 Hilger explained internal lateral osteotomies in which chisel is placed at the level of attachment of inferior turbinate after elevating mucoperiosteum under inferior turbinate.[35]

It is claimed to cause lesser degree of echymosis & edema around eyelid.

In 1976 Sheen emphasized high osteotomy rather than low one.[35]

In 1977 Webster et al have advocated curved lateral osteotomies towards dorsum of nose.[35]

In 2008 Tanner Erdem & Orhan Ozturam had explained the method of objective measurement of deviated nose & the method of preoperative & postoperative analysis.[11]

They had analysed the postoperative outcome & compared the pre & postoperative deviation from ideal situation. The success rate was divided into 4 categories. Excellent -90 to 100% , Good -70 to 89%, Moderate -50 to 69% & Bad <50%.

They had given a result of excellance in 18.8% of 'I' shaped deviation & 27.7% in 'C' shaped deformities.[11]

In 1985 Goodman & Gilbert had proved the success of autogenous iliac crest bone graft to be 92%.[27]

In 1998 Karacoglan had given 100% success rate by using autogenous iliac crest bone graft.[26]

In studies conducted by Dr.Muhamed Saeed & Farooq Ahmed Mian in Punjab Medical College the success rate of iliac crest bone graft was about 90%.[24]

The success rate of auricular cartilage graft was 100% in a study conducted by Murrell and George.[5]

Goldman had explained the technique of increasing the tip projection by burrowing the part of lateral crurae including the dome & stitching the medial crurae together.[35]

For an overprojected tip, In 1959 , Lipsett described to divide the alar cartilage at the level medial to dome in medial crura & then making multiple parallel cuts in the lateral crus.[35]

Jack Anderson in 1971 used the cartilage splitting incision for an endonasal approach to the dorsum & tip.[35]

In 1975 Bernstein suggested to achieve various degrees of sharpness of domes by scoring & morselisation. [35]

In 1976 Sheen explained the lateral rotation of alar cartilage to decrease the tip projection.[35]

In 1984 Berman advocated the technique of applying a suture between the anterior point of cartilaginous septum & posterior points on medial crurae by a non absorbable suture to increase tip projection. [35]

Various studies have shown an excellent result by closed rhinoplasty which was equivalent to an open approach.

EXTERNAL NASAL DEFORMITIES & THEIR ETIOLOGY

The common deformities of external nose that we come across are

Deformities of dorsum:

a) Hump nose
b) Saddle nose
c) Supratip deformity
d) Crooked nose deformity
    1) 'S' shaped
    2) 'C' shaped
    3) 'I' shaped
e) Broad nose

Deformities of tip:

a) Underprojected / Drooping / Retruded / Plunging tip
b) Overprojected tip
c) Bulbous tip
d) Bifid tip

Deformities of alae:

a) Flared alae
b) Pinched alae
c) Thin / Thick nostril border
d) Collapsed alae

Deformities of columella:

a) Short columella
b) Hidden columella
c) Hanging columella
d) Thick columella

Deformities associated with cleft lip:

a) Flattening of ala on the side of cleft
b) Dome displaced towards lip
c) Lateral crus abnormal & protrudes into nostril on the side of cleft
d) Horizontally placed nares
e) Columella slanted towards normal side
f) Septum deviated
g) Hypoplasia / Flattening of maxilla & floor of nasal vestibule

AETIOLOGIES

1) Congenital
2) Acquired

    Post surgical

    Post traumatic

    Destructive diseases of nose eg. Atrophic rhinitis , leprosy , Granulomatous disorders.

DEFINITIONS & CLASSIFICATION OF RHINOPLASTY PROCEDURES

BASED ON APPROACH:

1. Closed Rhinoplasty: Performed totally through intranasal incisions.
2. Open Rhinoplasty: Performed by external incisions & lifting off the soft tissue over the bony & cartilaginous framework. Provides a wider exposure of the bony-cartilaginous framework of the nose allowing better diagnosis and management of all deformities. However, it needs an external incision on the columella.

BASED ON INDICATION:

1. Corrective rhinoplasty: Done in order to correct an existing external nasal deformity of any aetiology.
2. Cosmetic rhinoplasty: Done in the absence of any obvious deformity of external nose but to change the shape of nose according to the need of the patient to add subjective sensation of beauty.
3. Reconstructive rhinoplasty: Performed to reconstruct the lost external nasal framework.

SURGICAL TECHNIQUES

The approaches are:

1. Endonasal
    a. transcartilaginous
    (intracartilaginous, cartilage splitting)
    b. retrograde (eversion)
    c. bipedicled chondrocutaneous flap (delivery)
2. External (open)

The following incisions can be used:

1. Alar cartilage incisions
    a. transcartilaginous (intracartilaginous, cartilage splitting)
    b. intercartilaginous
    c. marginal
2. Septal incisions
    a. Complete transfixion
    b. Partial transfixion
    c. Hemitransfixion
3. Transcolumellar incision

HUMP REMOVAL

SMALL TO MEDIUM DORSAL HUMPS (< 5mm):

- Simple rasping of the central septum proper
- The projecting part of the superior edge of the upper lateral cartilage is trimmed

LARGER DORSAL HUMPS (> 5 mm):

- Cartilaginous dorsum is reduced initially by reducing the septum and the upper lateral cartilages
- The guarded osteotome is placed at the caudal margin of the bony pyramid and driven superiorly

CROOKED NOSE

LATERAL OSTEOTOMY:

- Lateral osteotomy is performed with a 2mm/ 4mm osteotome from inferior, swept laterally to the bony nasofacial groove and then superiorly at the level of medial canthus .

MEDIAL OSTEOTOMIES:

- A 7mm osteotome placed on the edge of the nasal bone where it meets the dorsal septum angling 15 degrees laterally.
- Tapped with a mallet till the level of the medial canthus .
- Once the osteotomies performed, bilaterally fracture is completed with slight digital pressure.
- Three separate digital strokes are made along the mid dorsum and on either side to assess the smooth straight dorsum without irregularity

If the dorsal lines are too narrow or the middle vault has an **inverted V deformity** spreader grafts are indicated.

AUGMENTATION RHINOPLASTY

- Done for saddle nose deformity following injury, SMR, septal haematoma, abscess, excess removal of hump / congenital, etc

Implants :

1. Autografts :Nasal septum, pinna & rib cartilage

   Iliac crest, Mastoid cortex or tibia

2. Homograft (allografts):

   Preserved, irradiated or lyophilized cartilage and bone

3. Heterograft (xenograft) porcine or bovine collagen

4. synthetic Alloplasts : Silastic, acrylic, ivory, silicon, teflon, gore-tex, supramid mesh, proplast

Implant properties:

- Non toxic / non immunogenic.
- Must match to look and feel.
- Non resorbable.
- Easily available in adequate quantities.
- Easy to contour to the desired shape

DROOPING / RETRUDED / PLUNGING TIP

INTERCRURAL COLUMELLAR STRUTS-

To maintain or increase the tip projection

Floating strut:

- Placed between the medial crura 2 -3 mm in front of nasal spine

Fixed strut:

- It rests on the spine itself.
- Secured at the junction of medial crurae with a 5-0 absorbable suture.

MEDIAL CRURAL SUTURE

INTERDOMAL SUTURE

TRANSDOMAL SUTURE

GOLDMAN'S PROCEDURE

PROJECTED TIP

- Excising strip of cartilage in medial crurae of both sides

BULBOUS TIP

- Remove fibrofatty tissue between domes & suture the medial crurae.
- Remove a part of dome & suture.

ALAR DEFORMITIES

A. Flared Nose :

Cutaneous +/- vestibular tissue excision (WEIR Technique)

Bilateral alae brought close by stitching (Fomon clinching technique)

Pinched Nose :

Lateralisation of ala.

COMPLICATIONS

Aesthetic:

- hanging columella
- knuckling of the lower lateral cartilages
- polybeak
- pinched supratip
- dorsal irregularities

Functional complications:

Nasal airway obstruction

- postoperative edema
- crusting
- allergy
- untreated turbinate hypertrophy

Long term:

- loss of tip support (excessive cartilage excision)
-vestibular stenosis (poor placement of intranasal sutures)

Others:

- bleeding
- infection

Implant related:

- Infection
- Extrusion
- Allergy
- Rejection
- Absorption

MATERIALS & METHODS

25 patients who attended ENT department, Govt. Rajaji Hospital, Madurai from August 2009 to September 2011 were included in this study.

The diagnosis of various external nasal deformities were made on clinical grounds.

INCLUSION CRITERIA:

- External nasal deformities of dorsum with or without tip deformities.
- Crooked nose (C shaped, I shaped)
- Saddle nose
- Depressed dorsum

EXCLUSION CRITERIA:

- Age < 17 yrs
- Age > 45 yrs
- Patients with sinonasal inflammatory diseases
- Patients with associated medical diseases.

All patients were explained about the procedures , the outcome & the success rate. Informed written consent was obtained before the initiation of study.

All the patients were evaluated as follows:

1. History
2. General examination
3. Systemic examination
4. Otorhinolaryngological examination
5. Psychological evaluation
6. Investigations
   - Complete haemogram
   - Urine analysis
   - Blood sugar & urea
   - S.Creatinine
   - CT facial bones & PNS
7. Preoperative photographs for analyzing the deformity
   - Frontal view
   - Basal view
   - Right lateral view
   - Left lateral view
8. Assessment of patient for GA

INSTRUMENTS USED

COTTLE PERIOSTEAL ELEVATOR

SILVER NASAL CHISEL CURVED FOR RIGHT &

LEFT LATERAL OSTEOTOMY

SOOD RASP

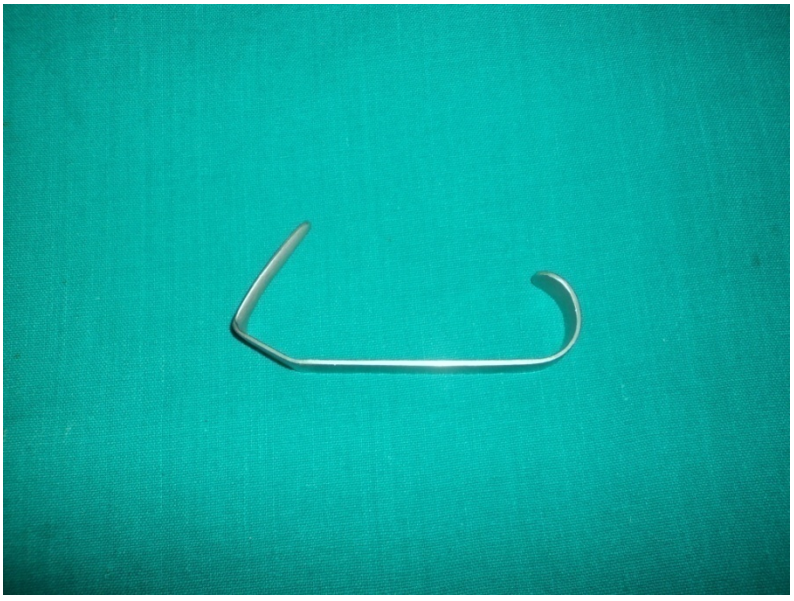
NASAL RETRACTOR

SILVER CHISEL WITHOUT GUARD

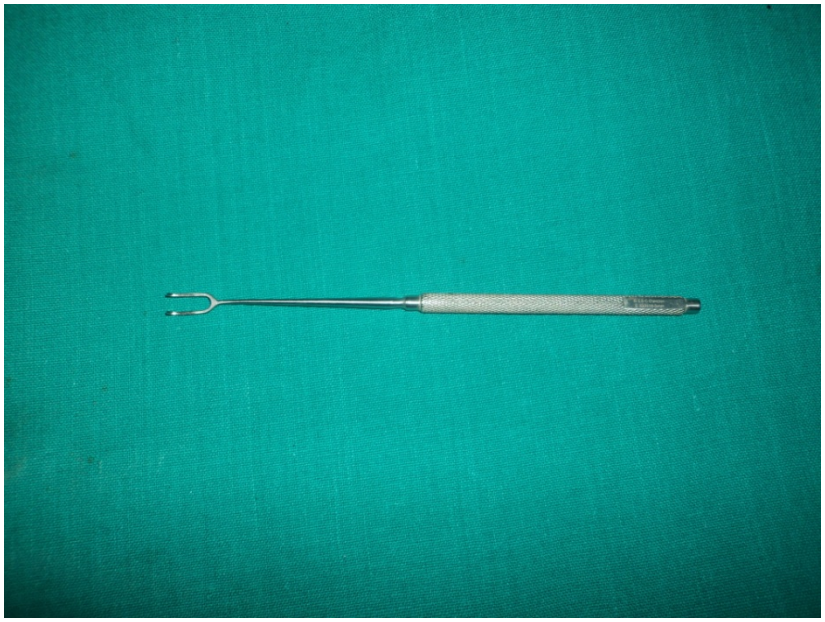
AUFRICT NASAL RETRACTOR

KILNER ALA RETRACTOR

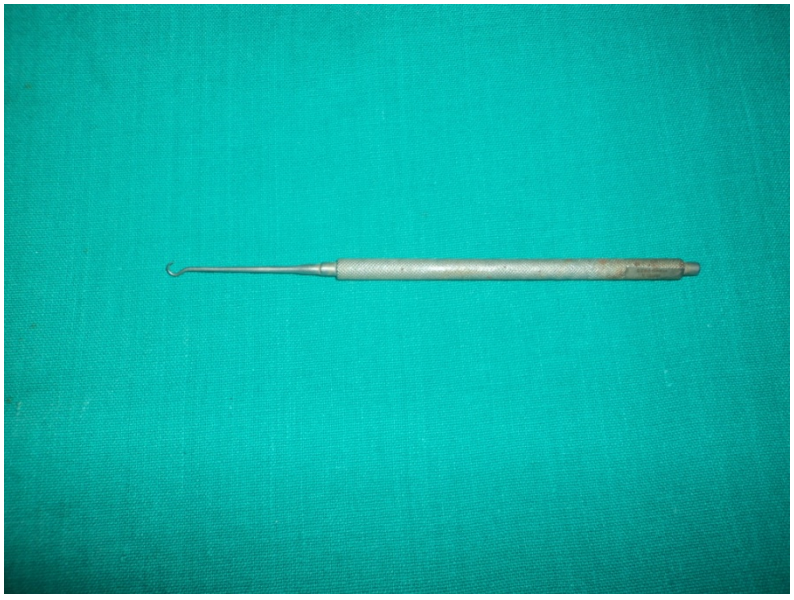
MALINAC NASAL RETRACTOR



DOUBLE SKIN HOOK



SKIN HOOK - SINGLE



SOOD ALAR CARTILAGE EVERTOR

ADSON'S TOOTHED & UNTOOTHED FORCEPS

AUFRICT RASP

SURGICAL PROTOCOL & METHODOLOGY

All the procedures were done under General Anaesthesia.

Local injection with Adrenaline Saline was given to elevate the soft tissues (Hydrodissection) & to reduce the intraoperative bleeding.

All the jobs over the dorsum were done by endonasal approach using Intercartilagenous incision.

Tip works when necessary were done by an open approach using a 'V' or an inverted 'V' shaped midcolumellar incision.

CROOKED NOSE DEFORMITIES:

Septal deviation if present were corrected .

Lateral , transverse & medial osteotomies were done.

Nasal framework aligned in midline.

SADDLE NOSE DEFORMITIES:

Augmented using autogenous iliac crest bone graft or conchal cartilage as required.

HUMP :

Dorsal strip of septal cartilage was removed.

Bony hump removed using osteotome.

PER-OPERATIVE PICTURES

FOR CROOKED NOSE

INTERCARTILAGENOUS INCISION:

ELEVATING THE SOFT TISSUES:

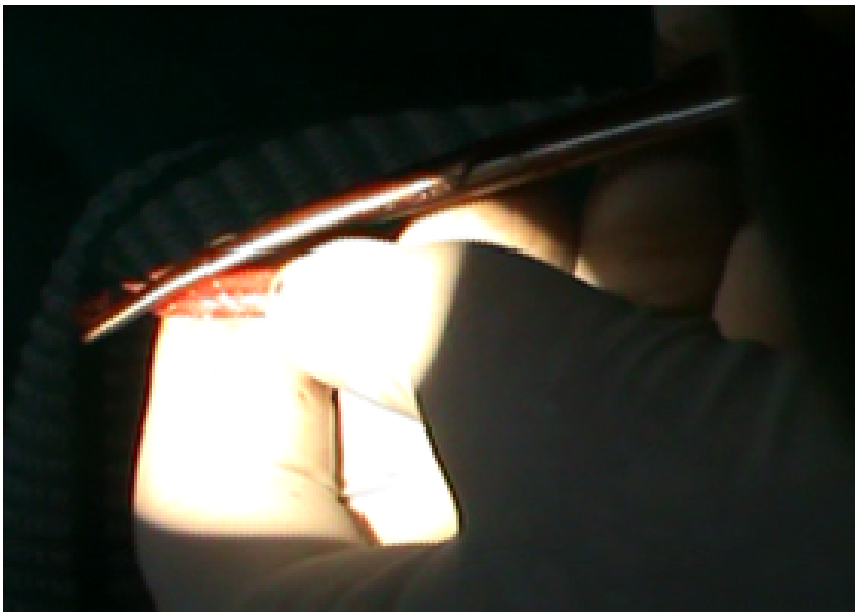
LATERAL & MEDIAN OSTEOTOMIES:

ASSEMBLING THE BONY VAULT:

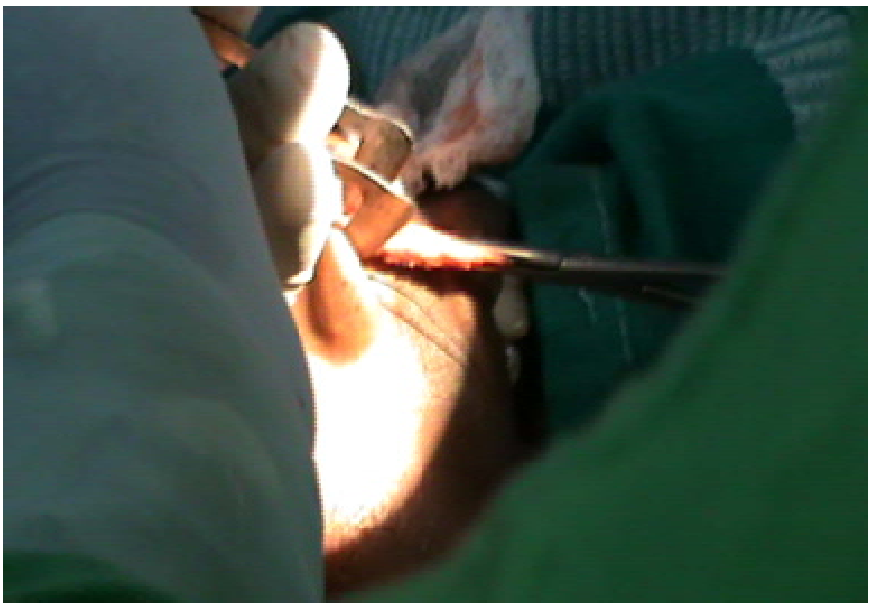
FOR SADDLE NOSE

HARVESTED ILIAC CREST BONE GRAFT:

SHAPENING THE BONE GRAFT:



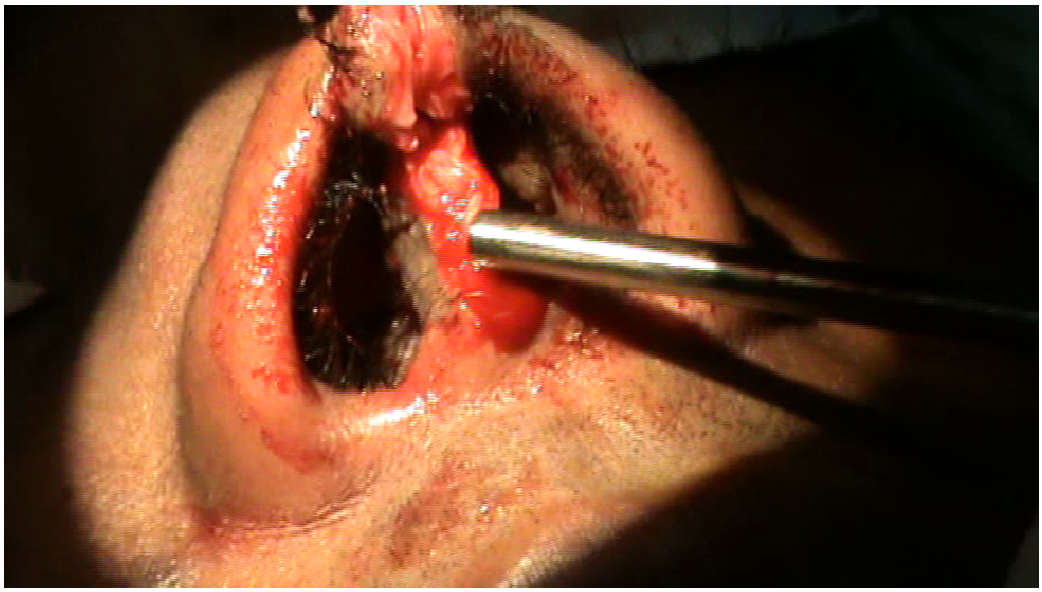
PLACING THE GRAFT:



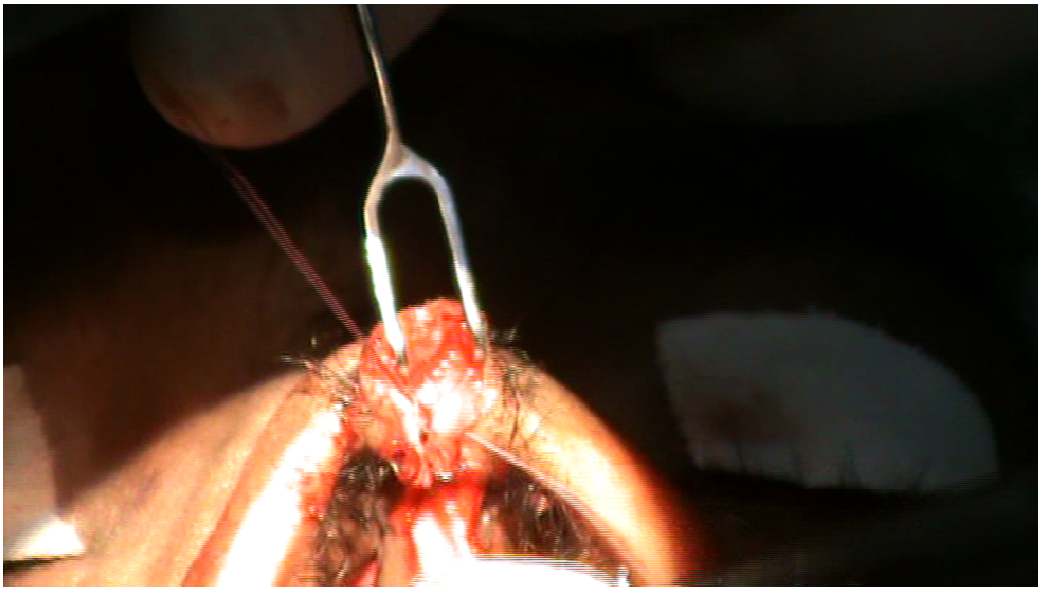
TIP PLASTY

MIDCOLUMELLAR INCISION:

EXPOSING THE LOWER LATERAL CARTILAGES:



INTERDOMAL SUTURING:



TIP DEFORMITIES:

Corrected by applying interdomal sutures or intercrural sutures.

After completing the procedures nose was packed with medicated gauze & an external nasal splint was applied.

FOLLOW UP:

1) Anterior nasal pack removed on 2nd postoperative day.
2) Donor site sutures were removed on 7th postoperative day
3) IV antibiotics for 3 days followed by oral antibiotics for 7 days.
4) Patients were discharged on 7th postoperative day.
5) External nasal splint removed on 21st postoperative day.
6) Saline nasal drops for 1 month.
7) Monthly once follow up for first 6 months then once in 6 months.

POSTOPERATIVE RESULT ASSESSMENT :

1) SUBJECTIVE
    a. Aesthetic enquiry
    b. Functional enquiry
2) OBJECTIVE
    a. Aesthetic analysis by postoperative photograghs taken 6 months after surgery.
    b. Examination of nasal airflow by Cold spatula test.

HOW WE ANALYSED (DEFORMITY SPECIFIC)

CROOKED NOSE (‘C’ SHAPED) (Fig:1)

Step 1 : A line was drawn from the point of maximum deviation to the glabella.(a)

Step 2 : Another line was drawn from the same point to the nasal tip.(b)

Step 3 : The angle between the two lines was measured.(c)

The same steps were repeated postoperatively.

The desired angle is 180□ . The pre- and post-operative deviation from the

ideal situation were compared.

CROOKED NOSE (‘I’ SHAPED) (Fig: 2):

Step 1: Mid vertical line of face was drawn from the glabella to the menton.(a)

Step 2: Another line was drawn from the nasion to the nasal tip.(b)

Step 3: The angle between these two lines was measured.(c)

The desired angle is 0□ . The pre- & post-operative deviation from the ideal situation were compared.

Figure 1

Figure 2

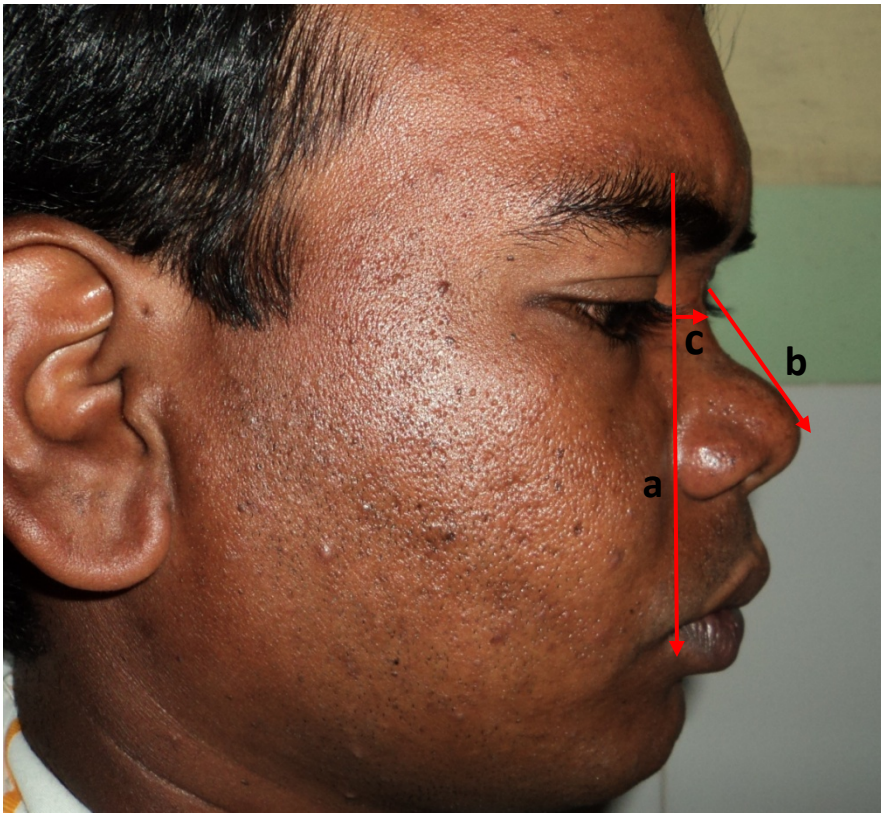


Figure 3

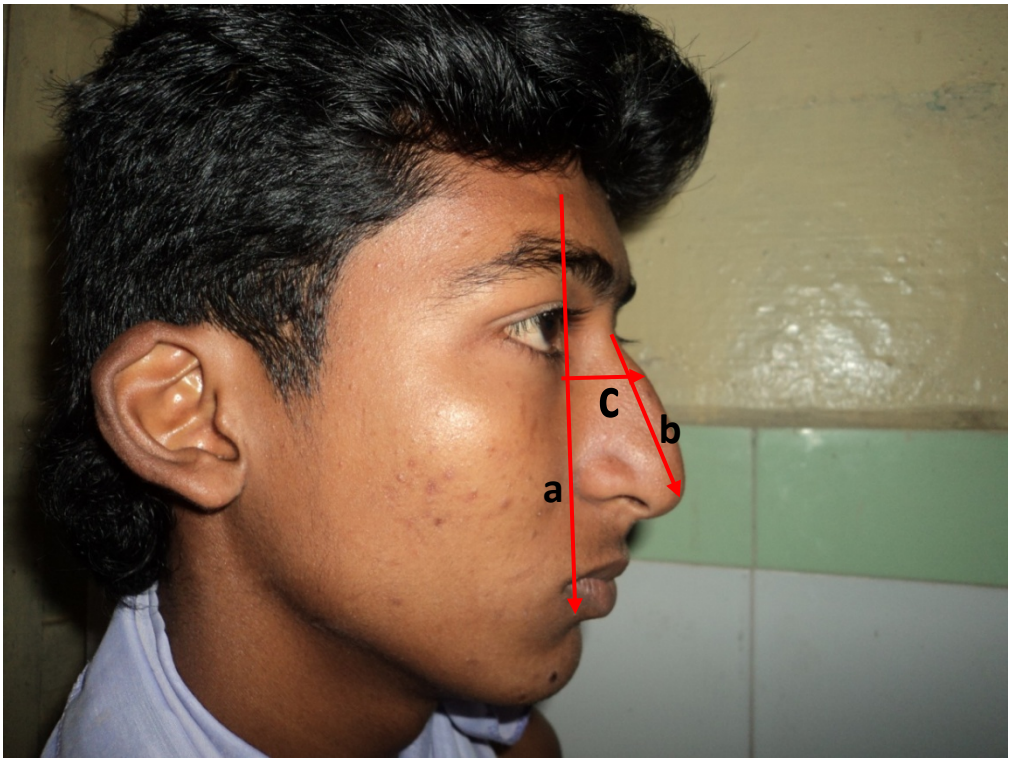


Figure 4

SADDLE & HUMP NOSE (Fig: 3 & 4)

The analysis were exercised in photographs that were taken in lateral view. In order to avoid the observer's bias, instead of simply measuring the dorsal height the following steps were done.

Step 1 : A line was drawn from the nasion to nasal tip & its length was measured.(a)

Step 2 : Line of facial plane was drawn.(b)

Step 3 : A perpendicular line was drawn from the line of facial plane to the point of maximum concavity/convexity (c) . Its length was measured.

The ratio of (a) & (c) was calculated. The pre- & post-operative ratios were compared.

Based on the results we have graded the outcome as follows:

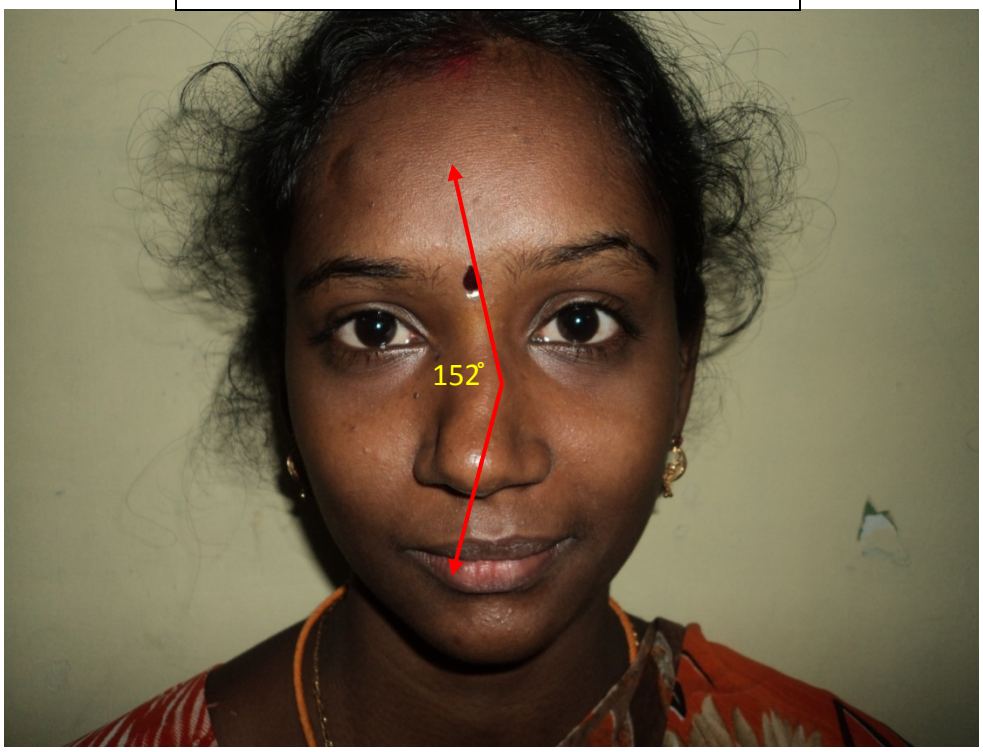
Outcome	Degree of correction
Excellent	90-100%
Good	70-89%
Fair	50-69%
Poor	<50%

1.

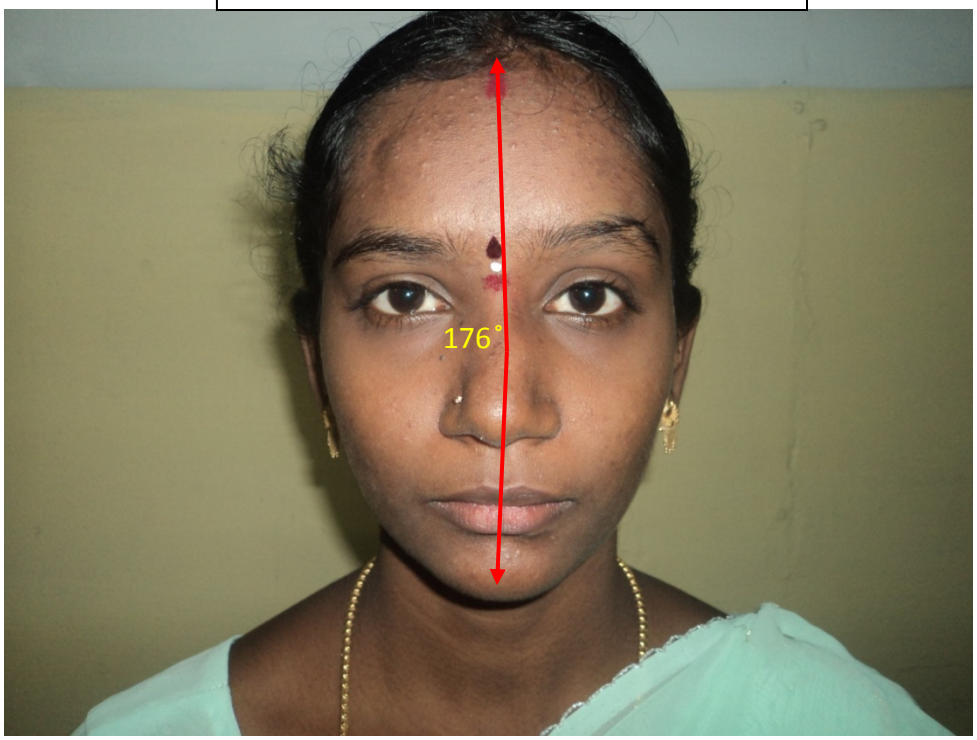
PRE OPERATIVE

POST OPERATIVE

PRE OPERATIVE



POST OPERATIVE

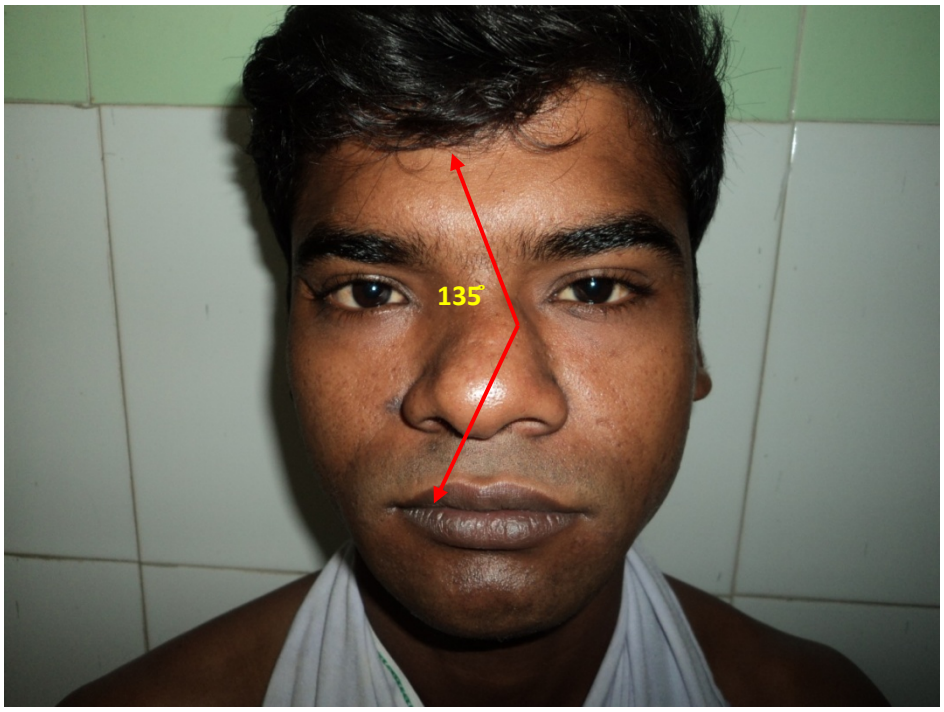


2.

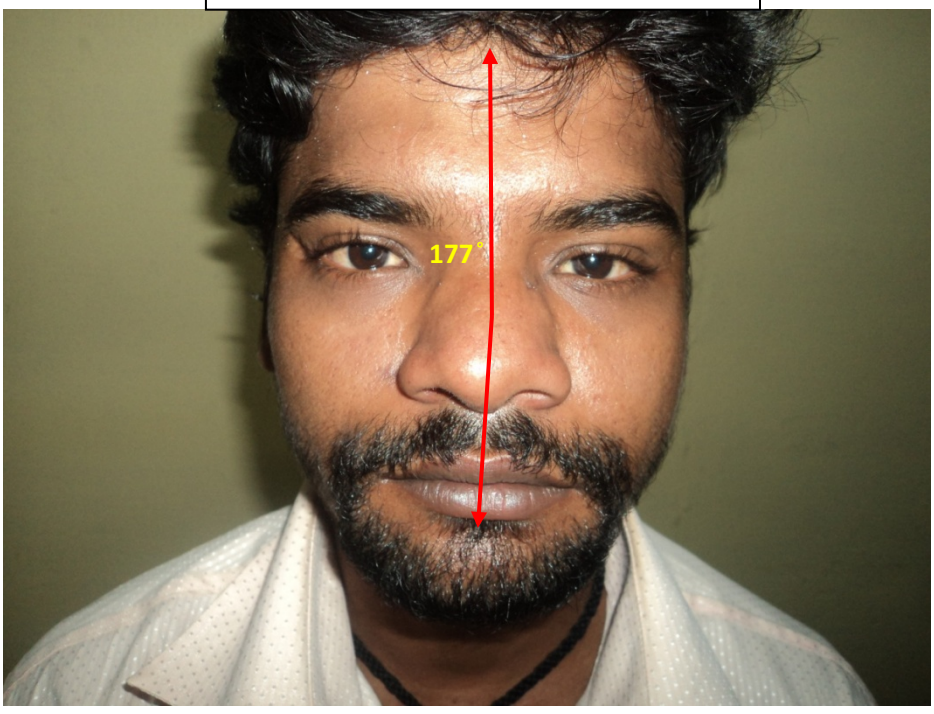
PRE OPERATIVE

POST OPERATIVE

PRE OPERATIVE



POST OPERATIVE



3.

PRE OPERATIVE

POST OPERATIVE

PRE OPERATIVE

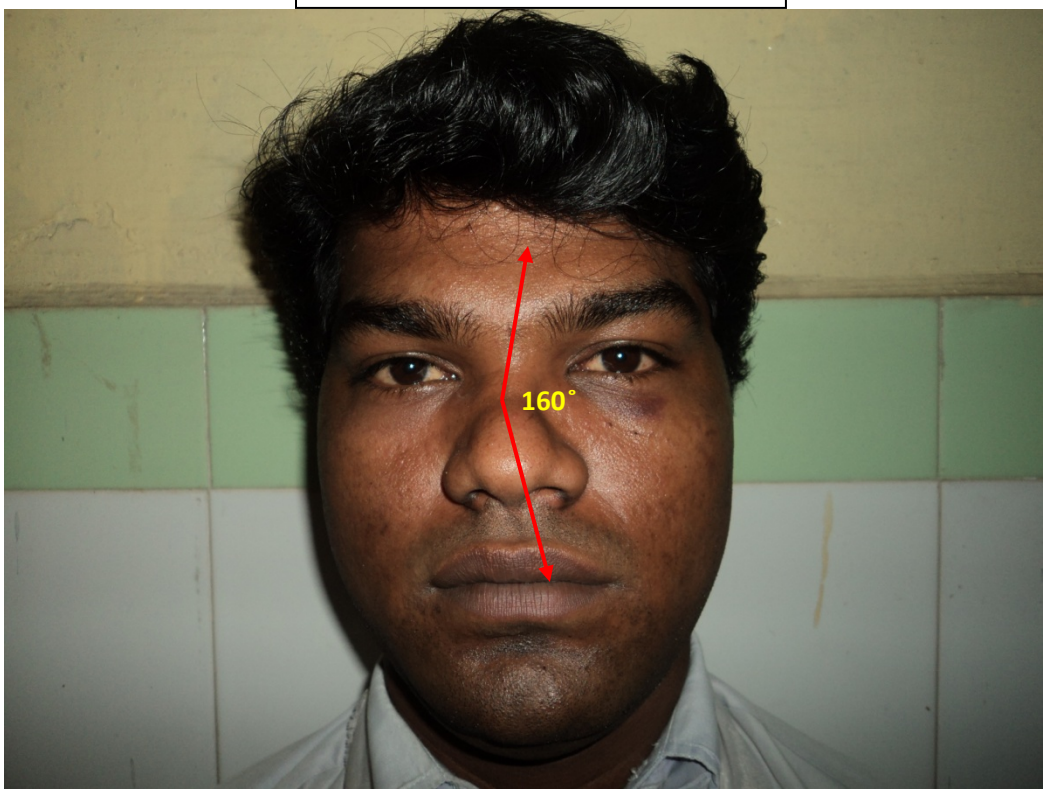
POST OPERATIVE

4.

PRE OPERATIVE

POST OPERATIVE

PRE OPERATIVE



POST OPERATIVE

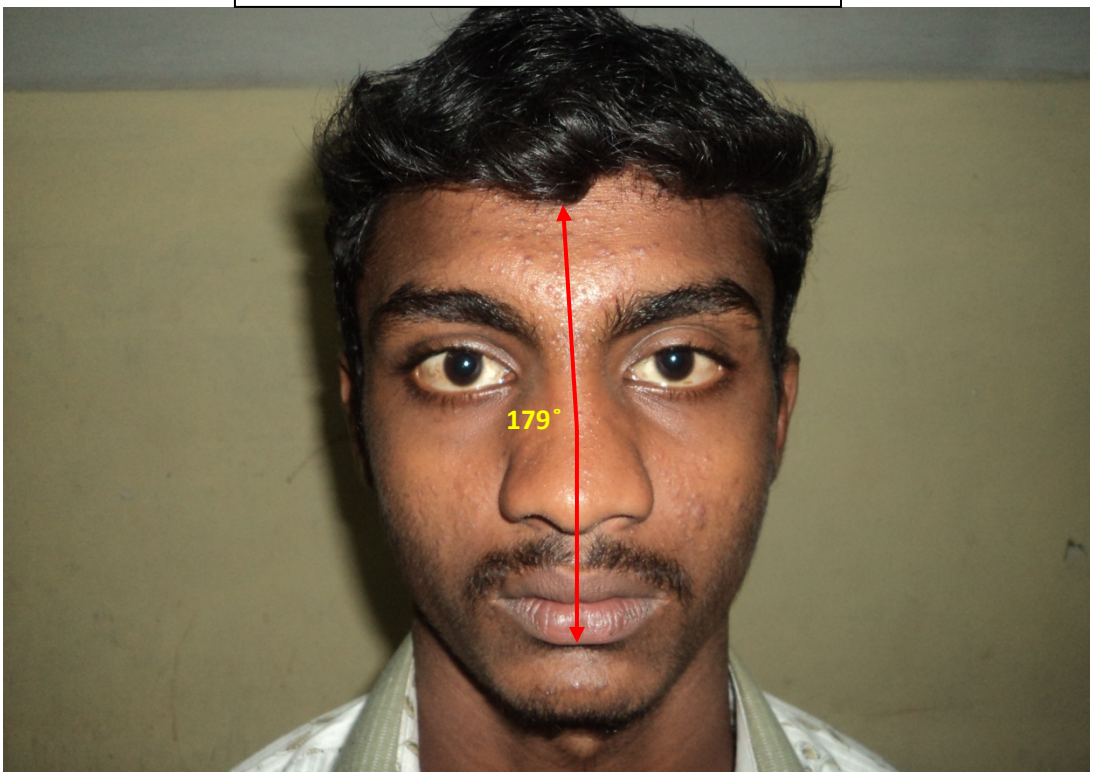
5.

PRE OPERATIVE

POST OPERATIVE

PRE OPERATIVE

POST OPERATIVE



6.

PRE OPERATIVE

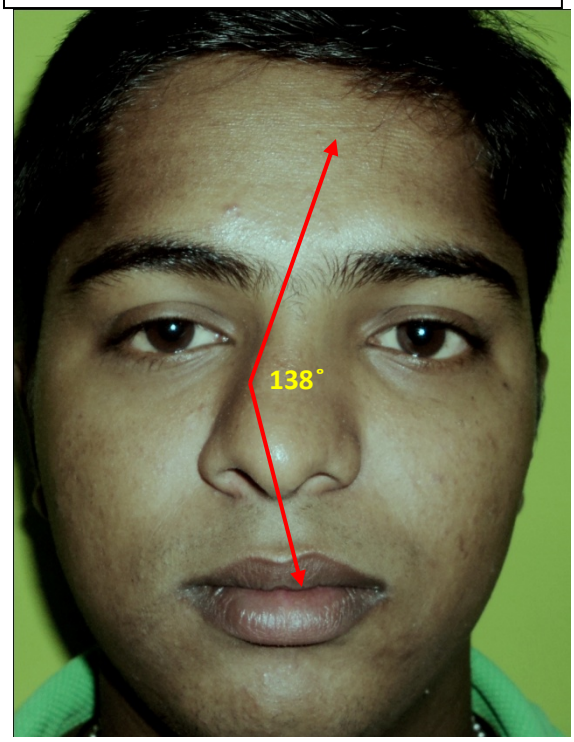
POST OPERATIVE

7.

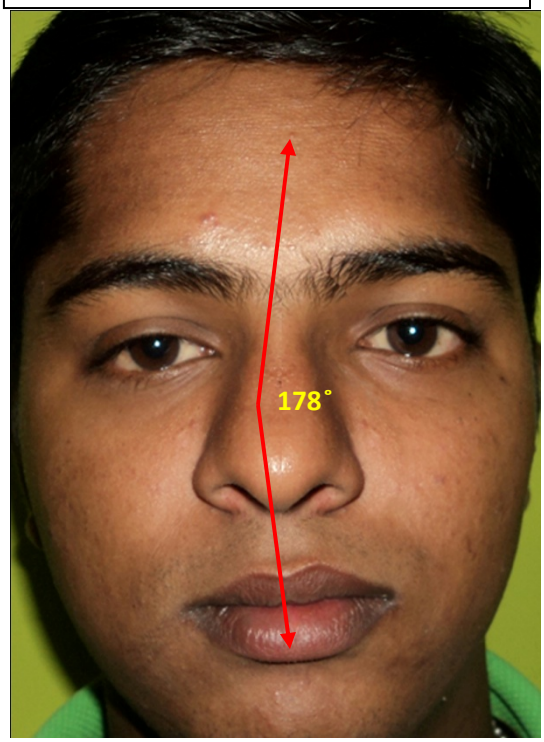
PRE OPERATIVE

POST OPERATIVE

PRE OPERATIVE



POST OPERATIVE



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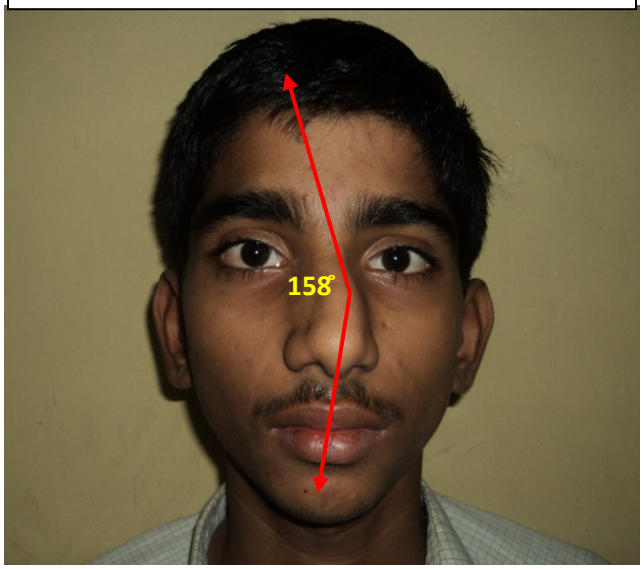

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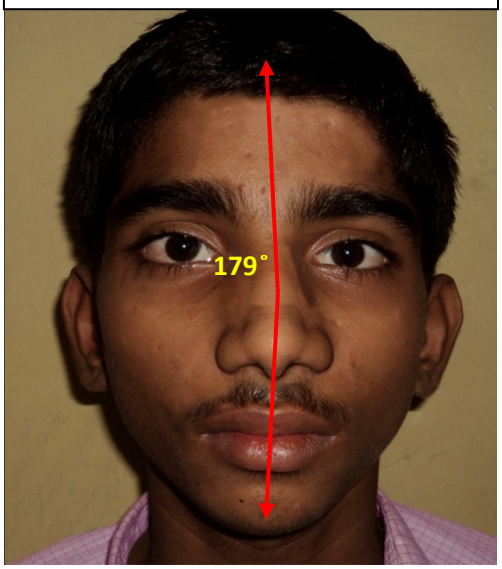
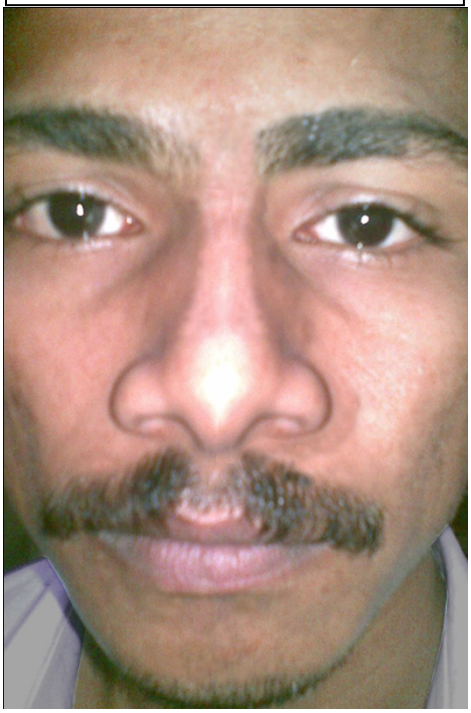


8.

PRE OPERATIVE

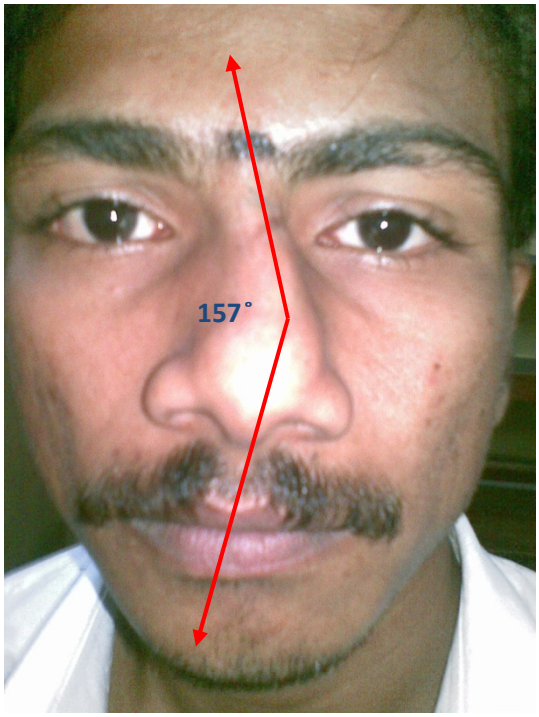
POST OPERATIVE

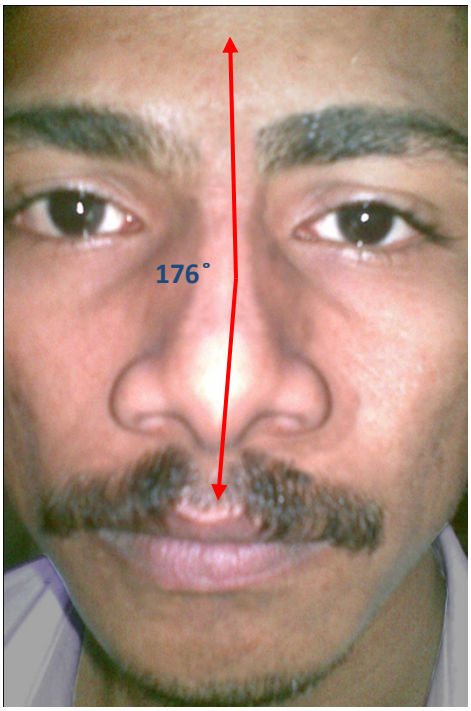


9.

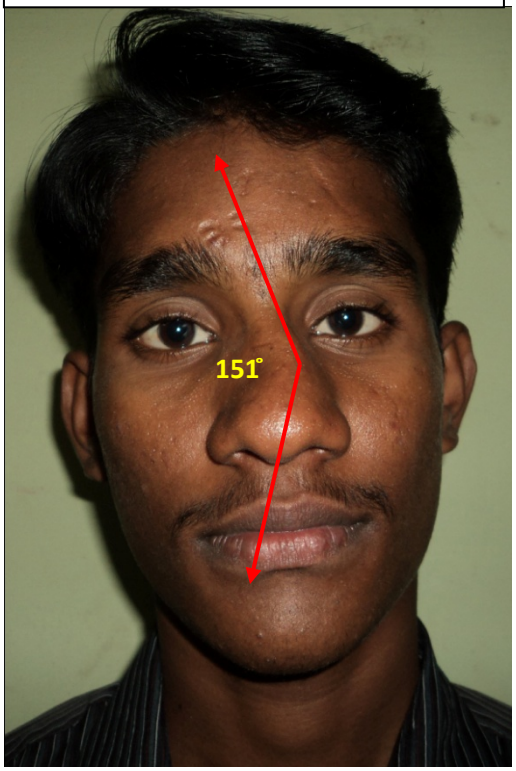
PRE OPERATIVE

POST OPERATIVE





PRE OPERATIVE



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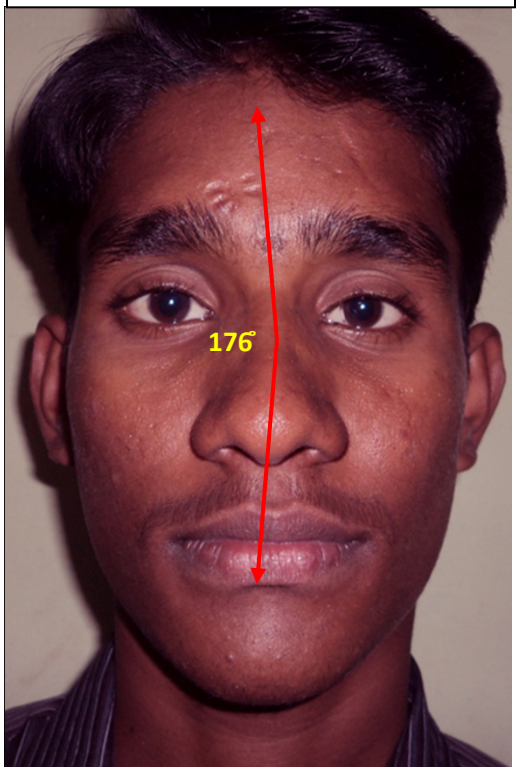

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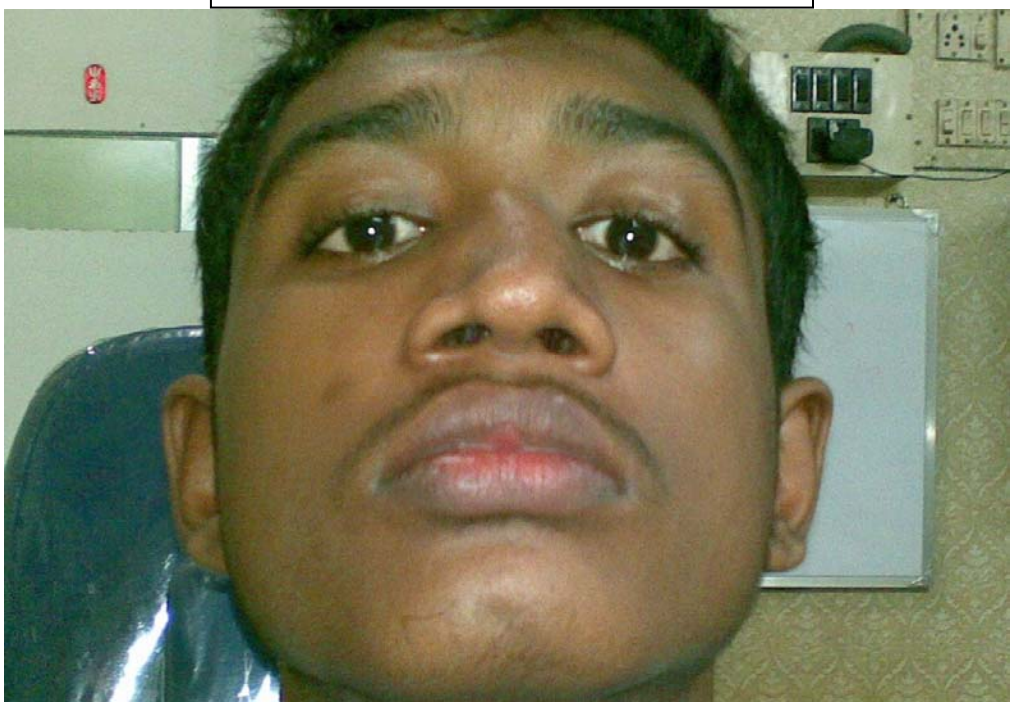

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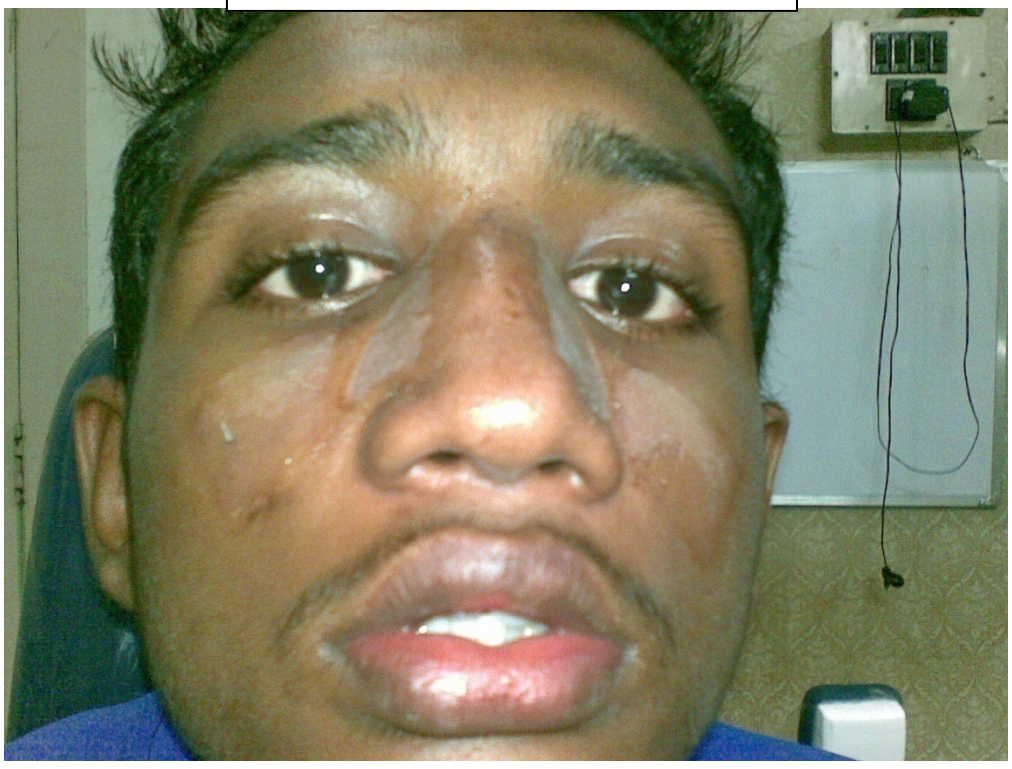

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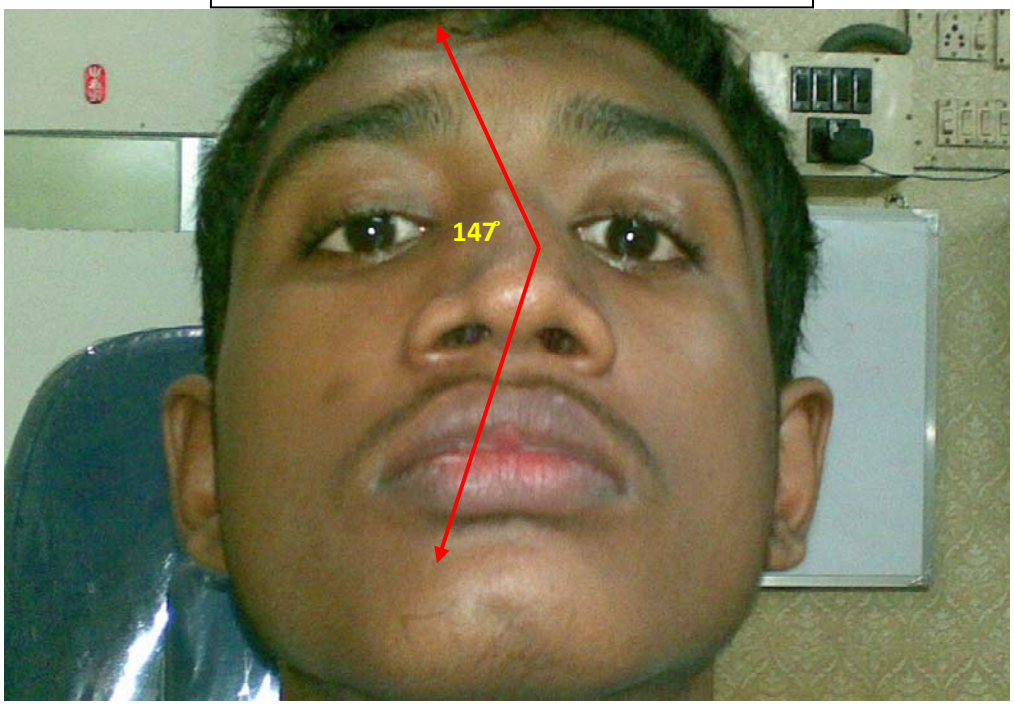

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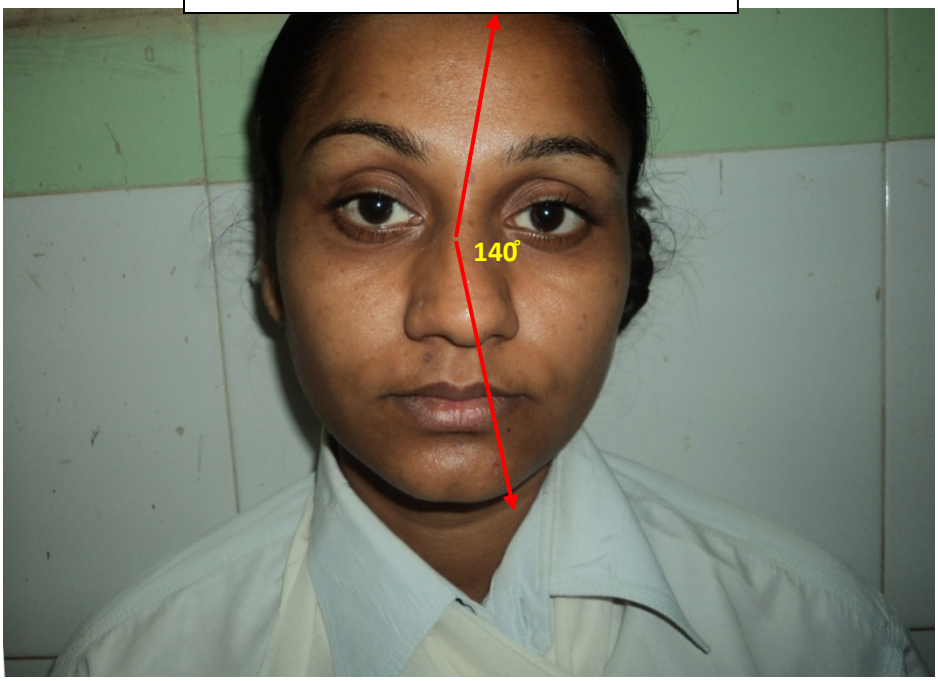

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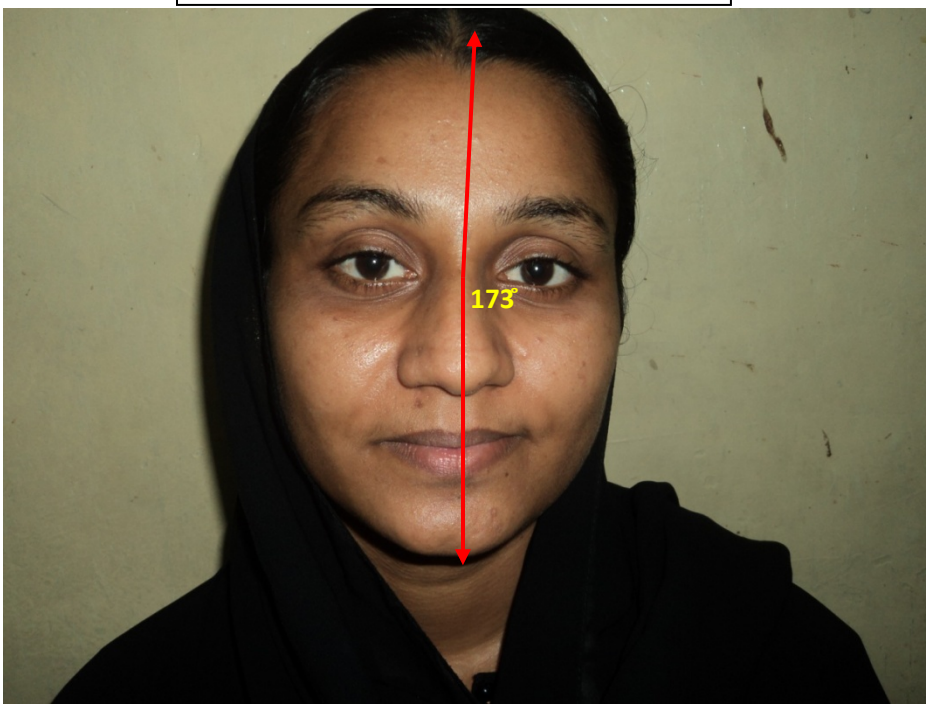

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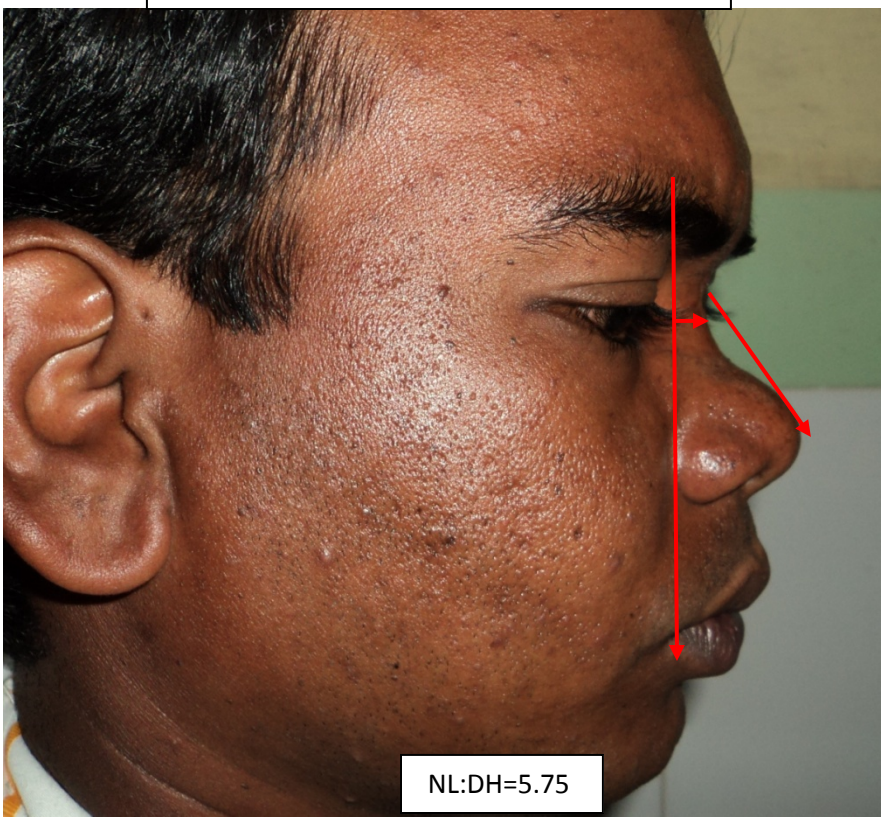

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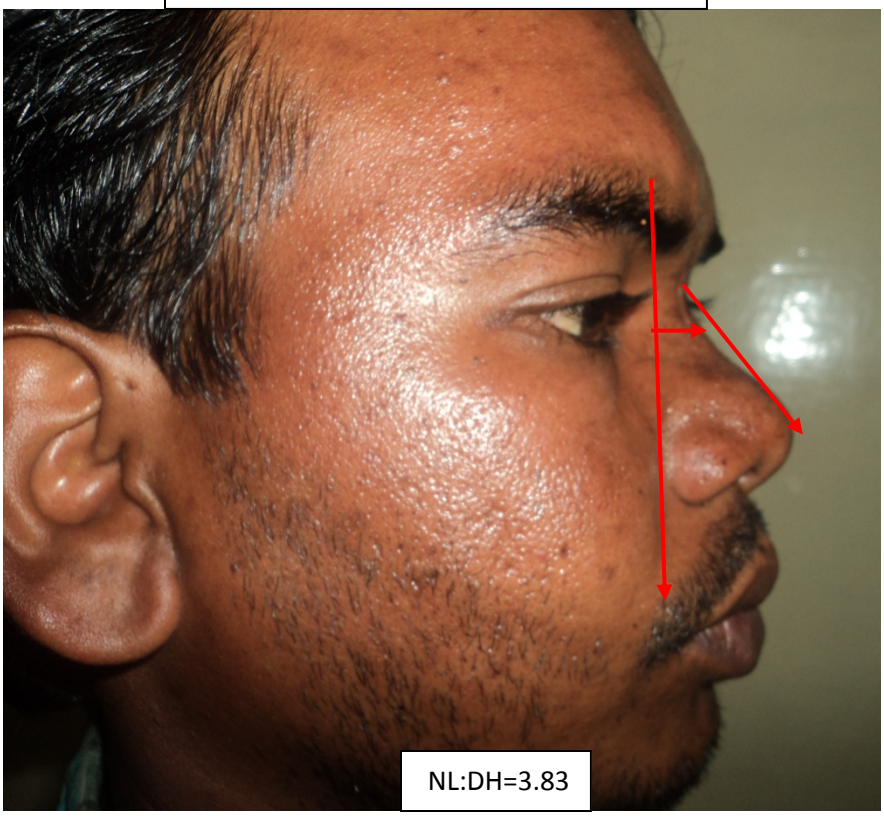

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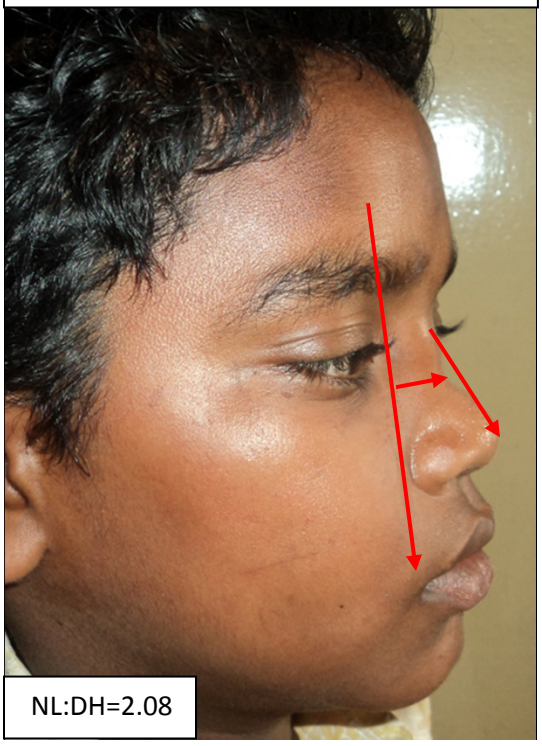

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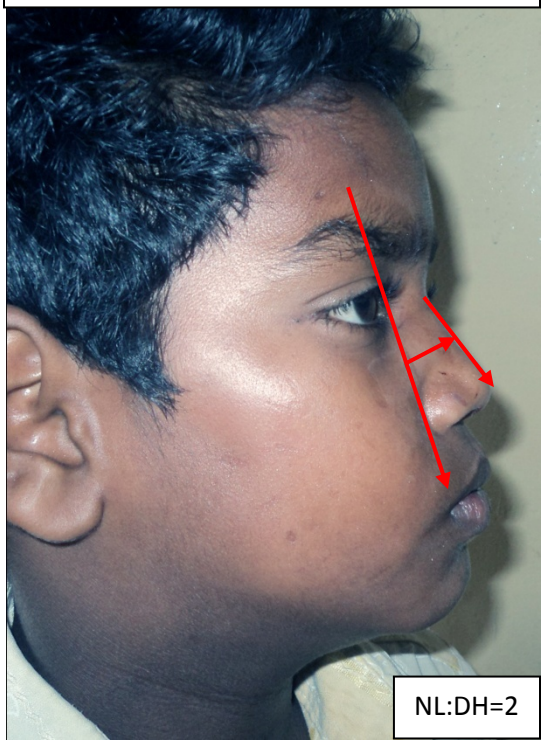

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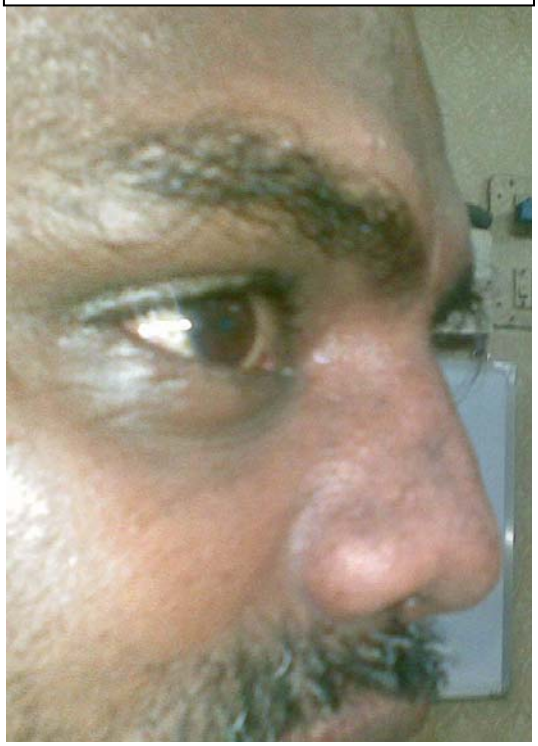

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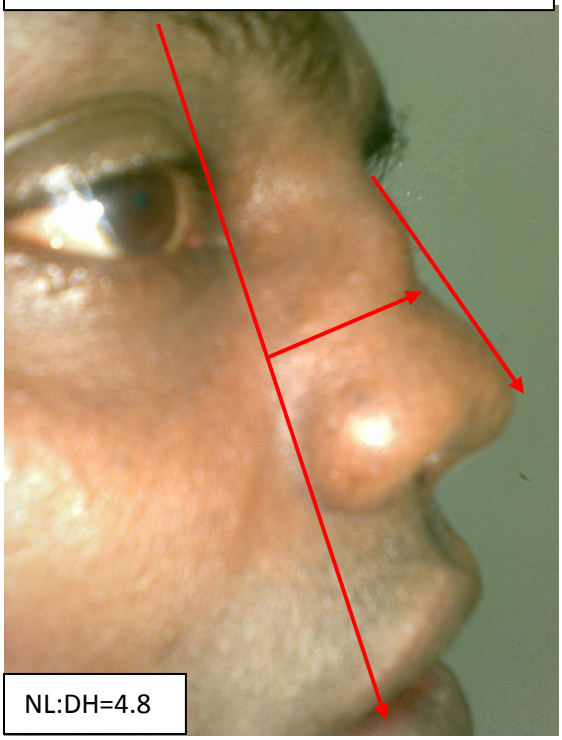

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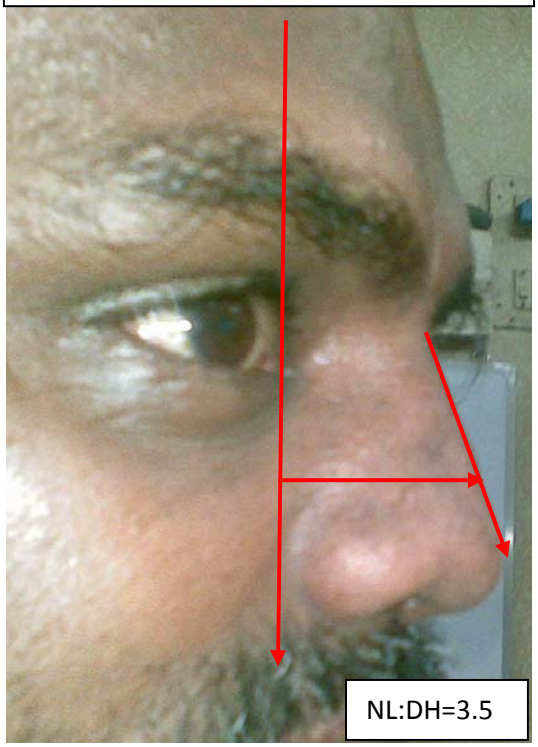

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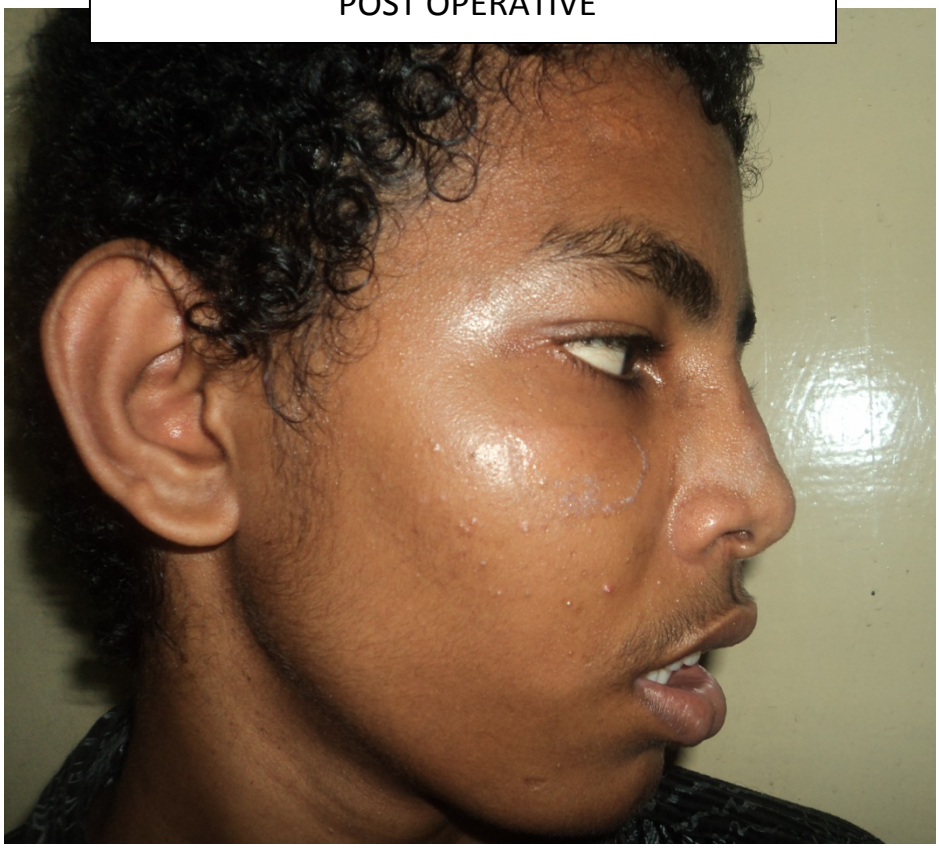

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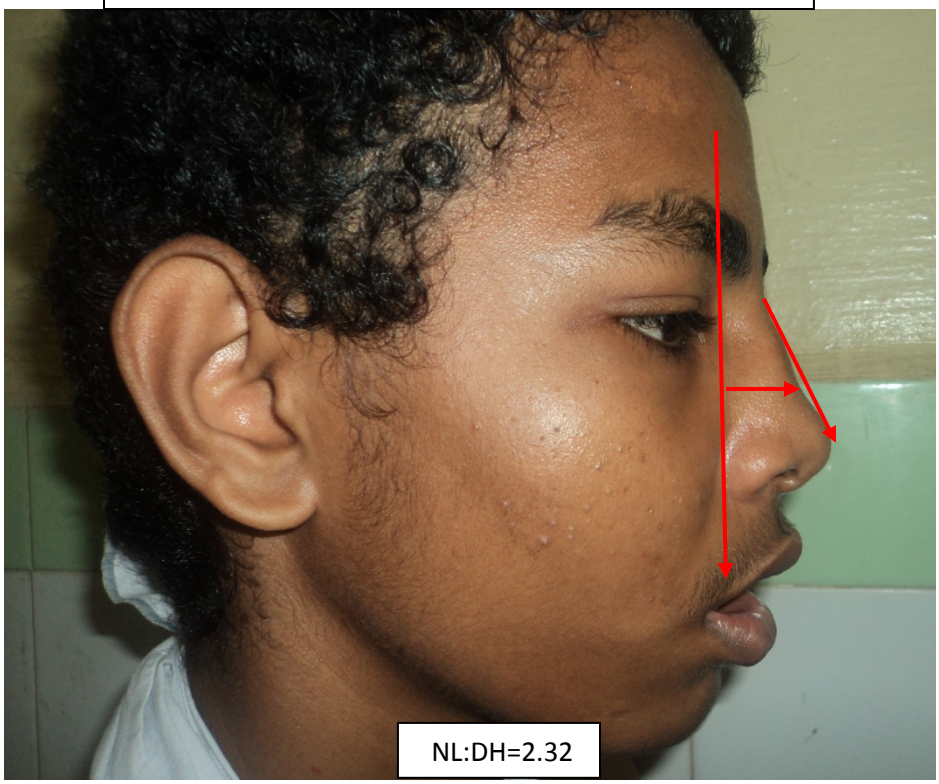

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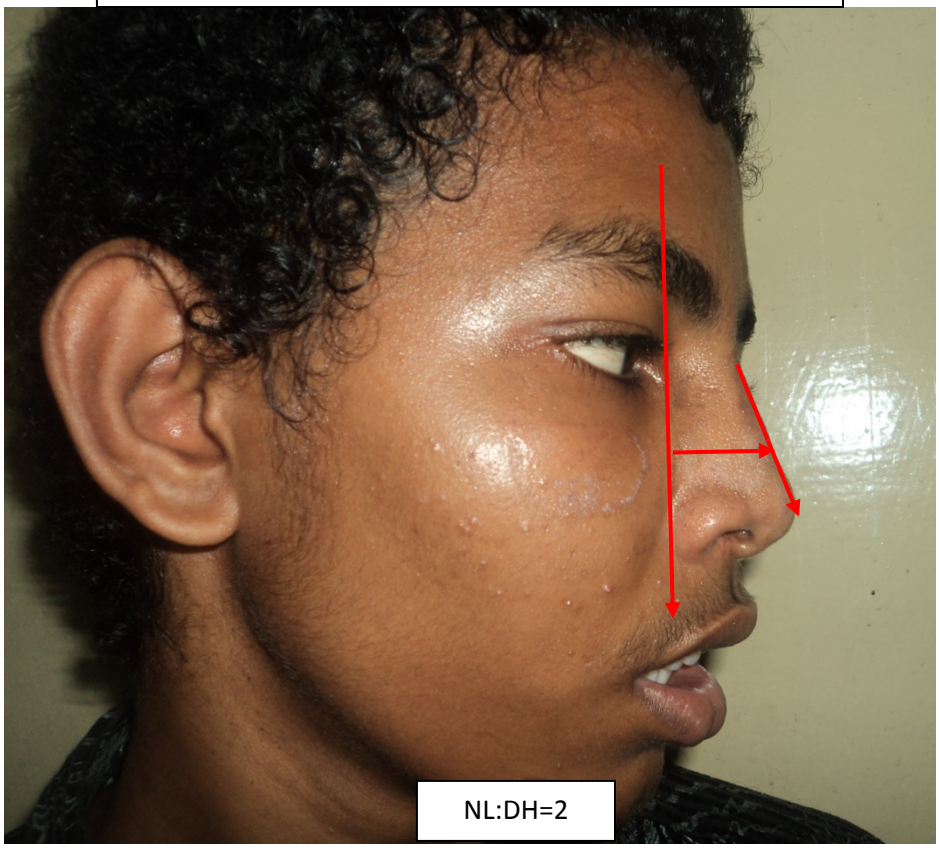

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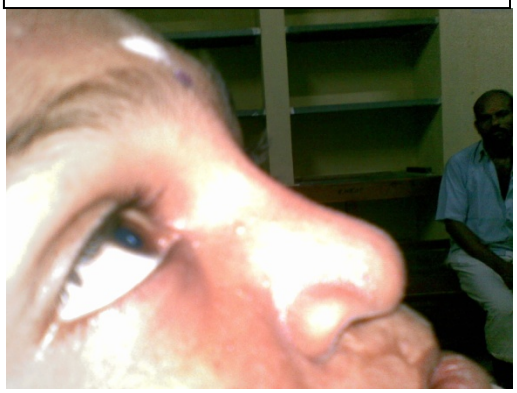

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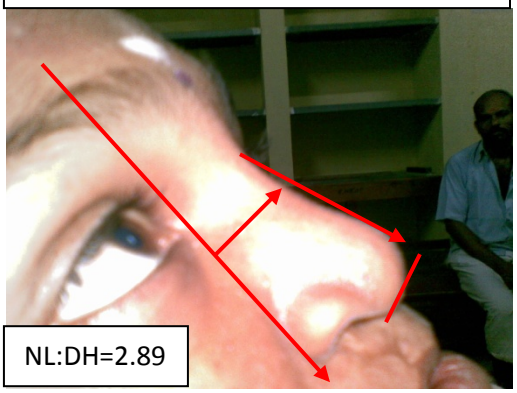

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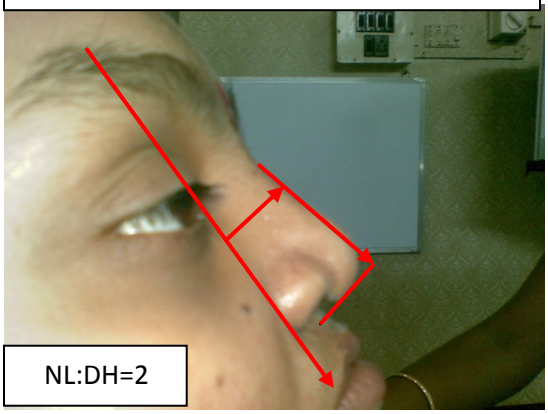

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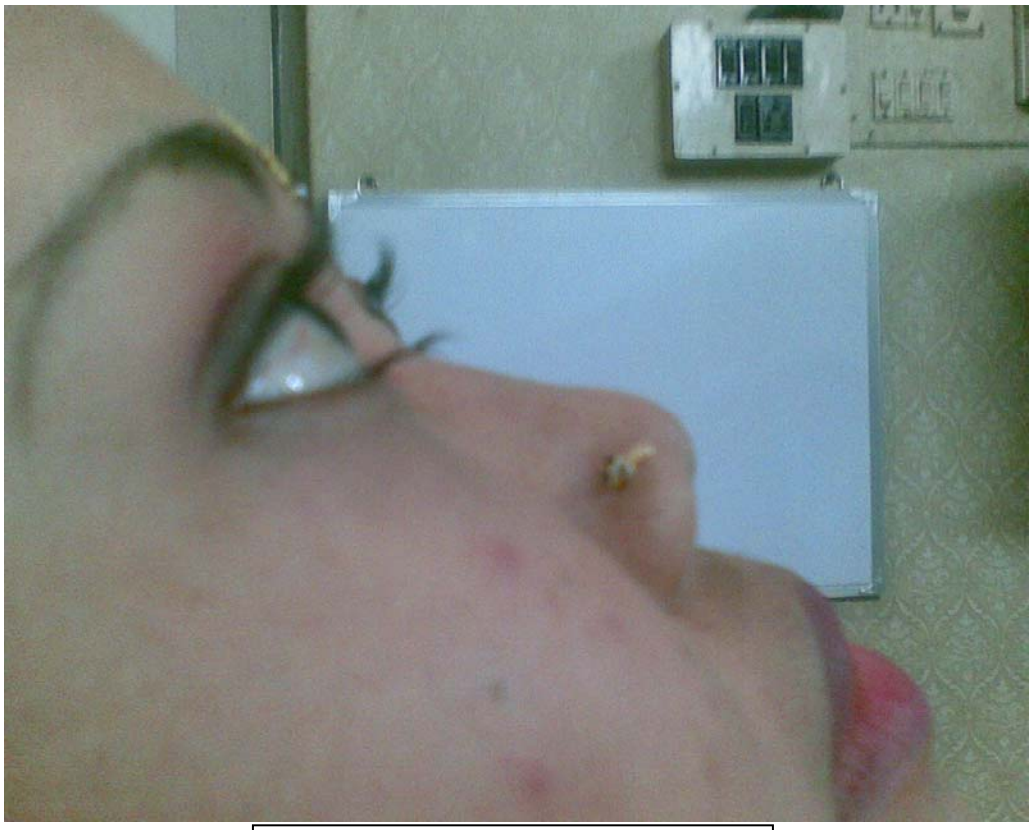

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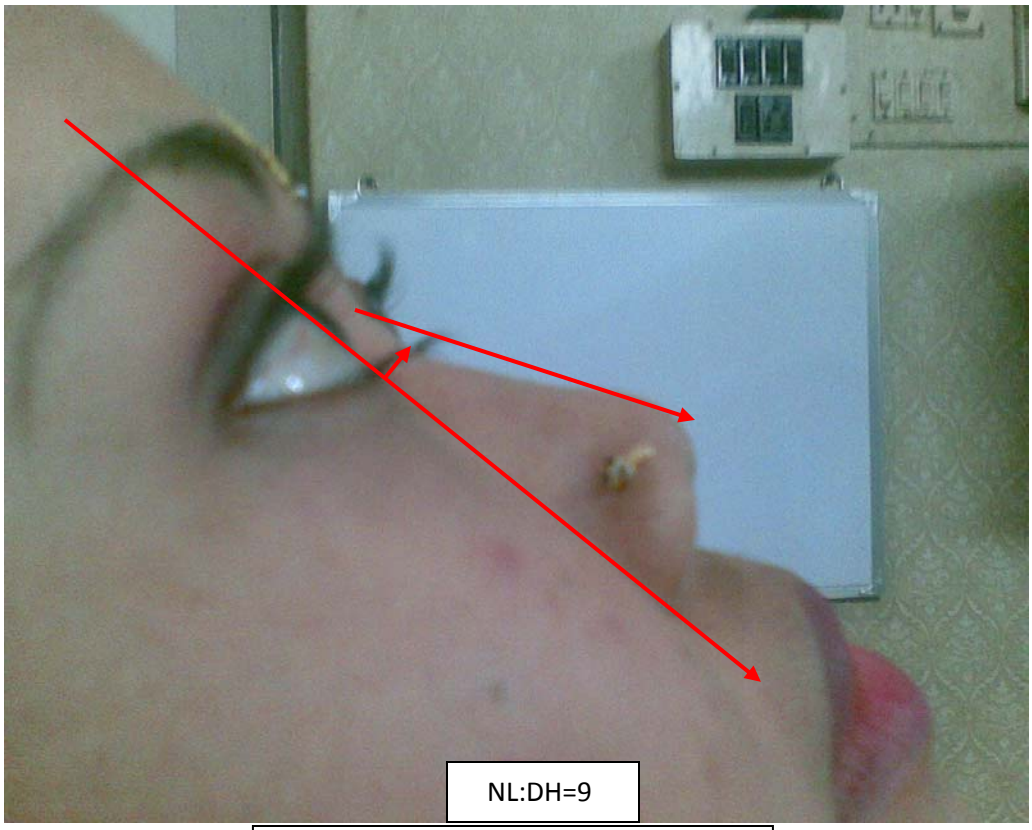

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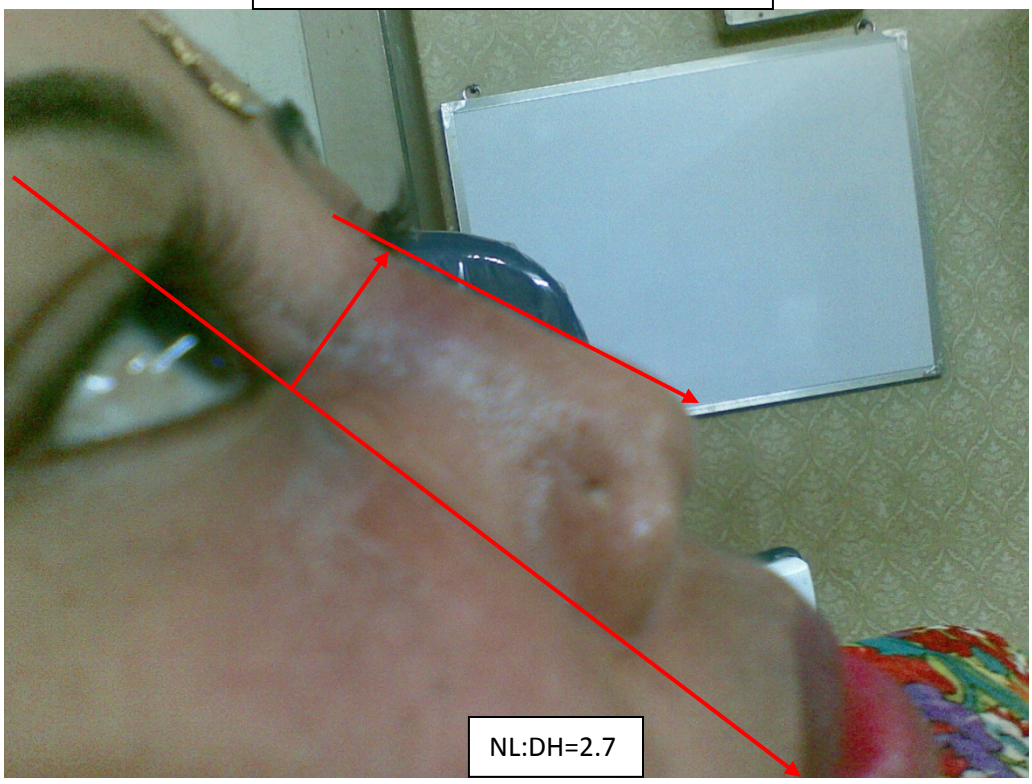

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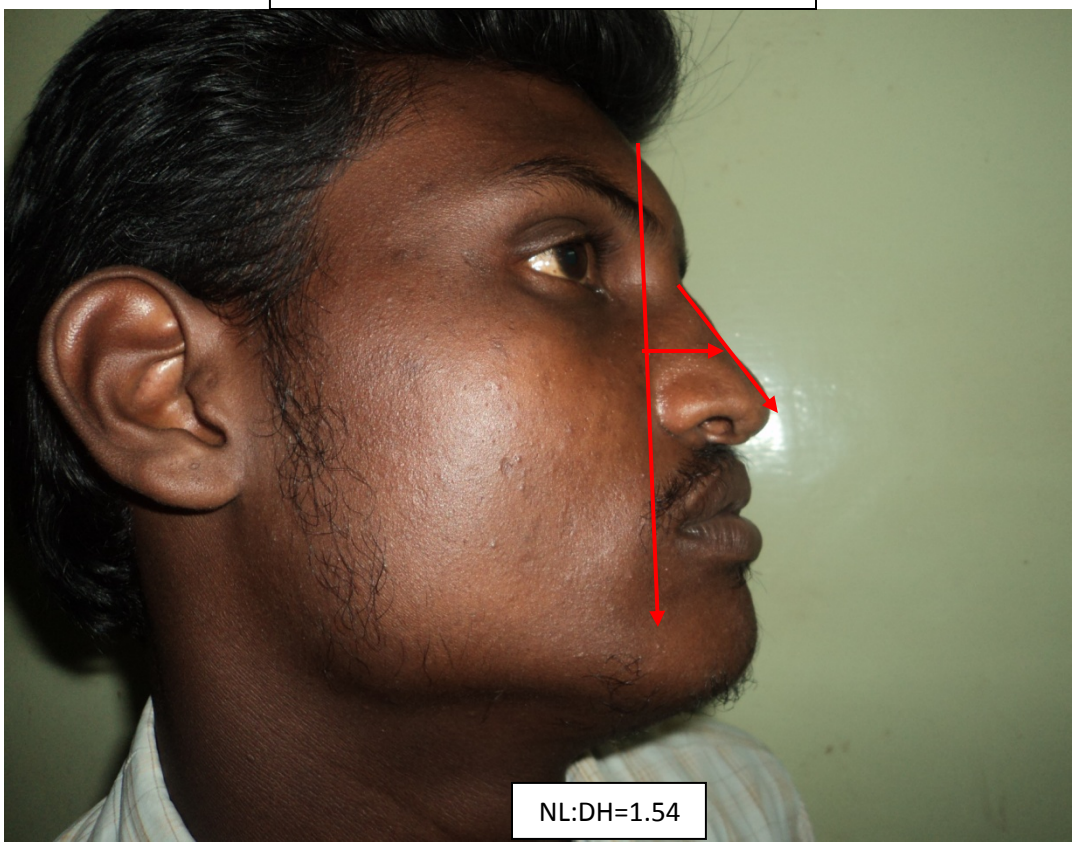

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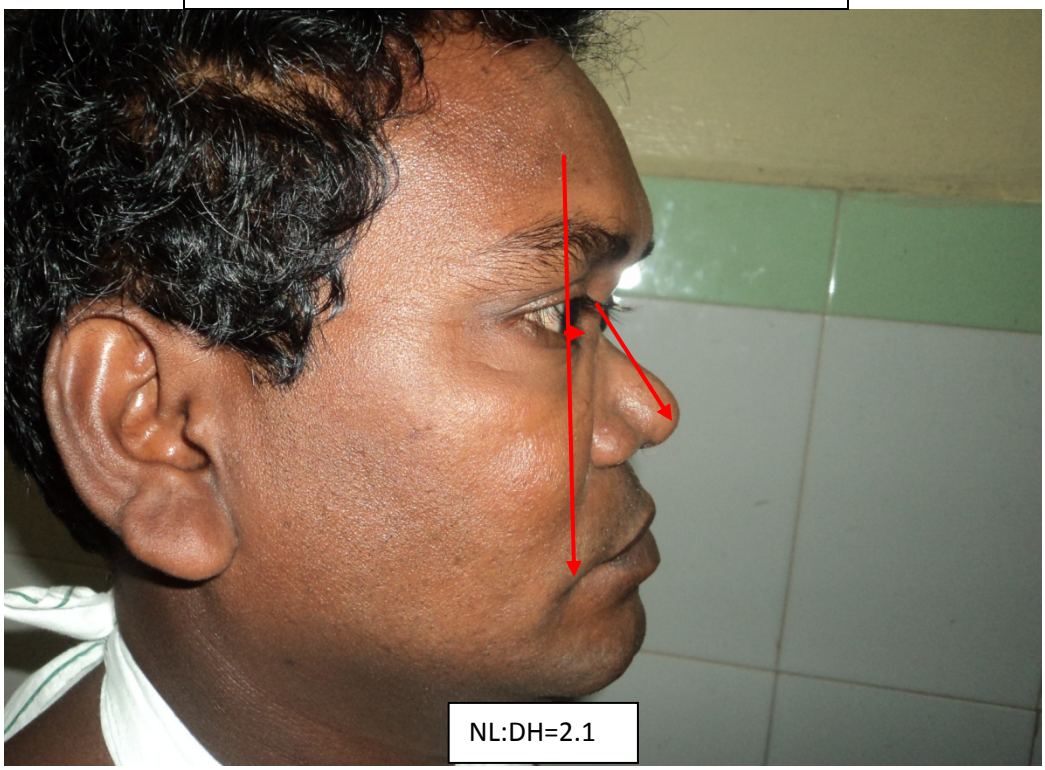

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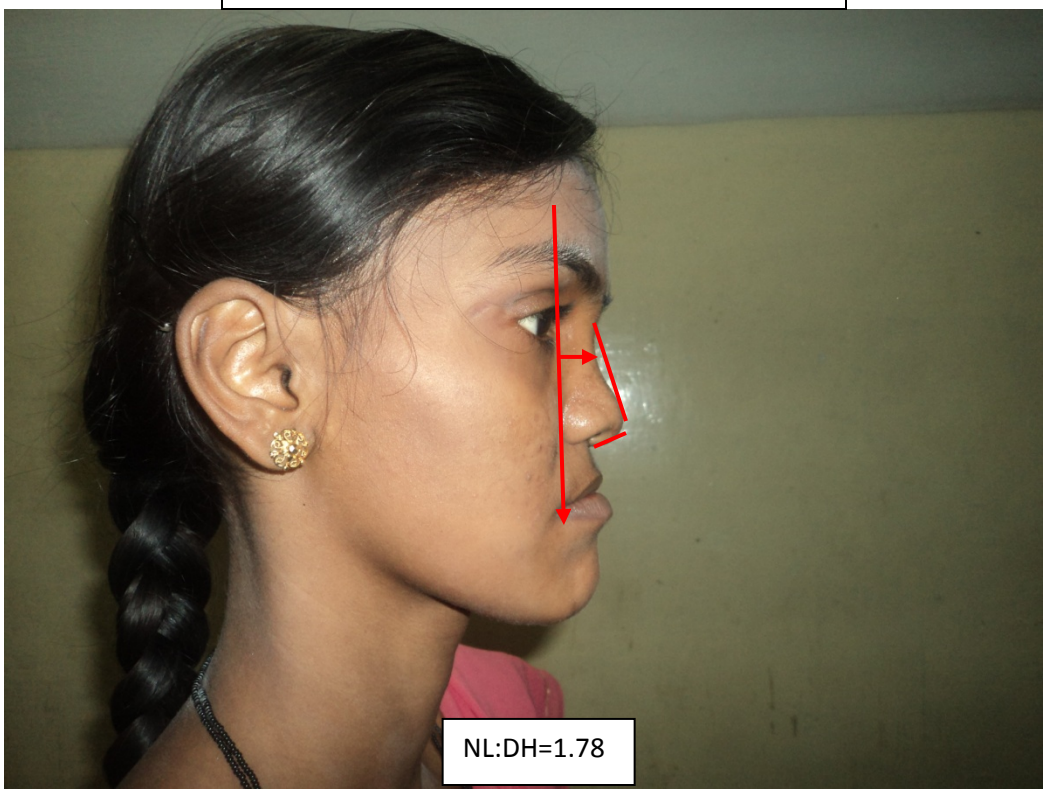

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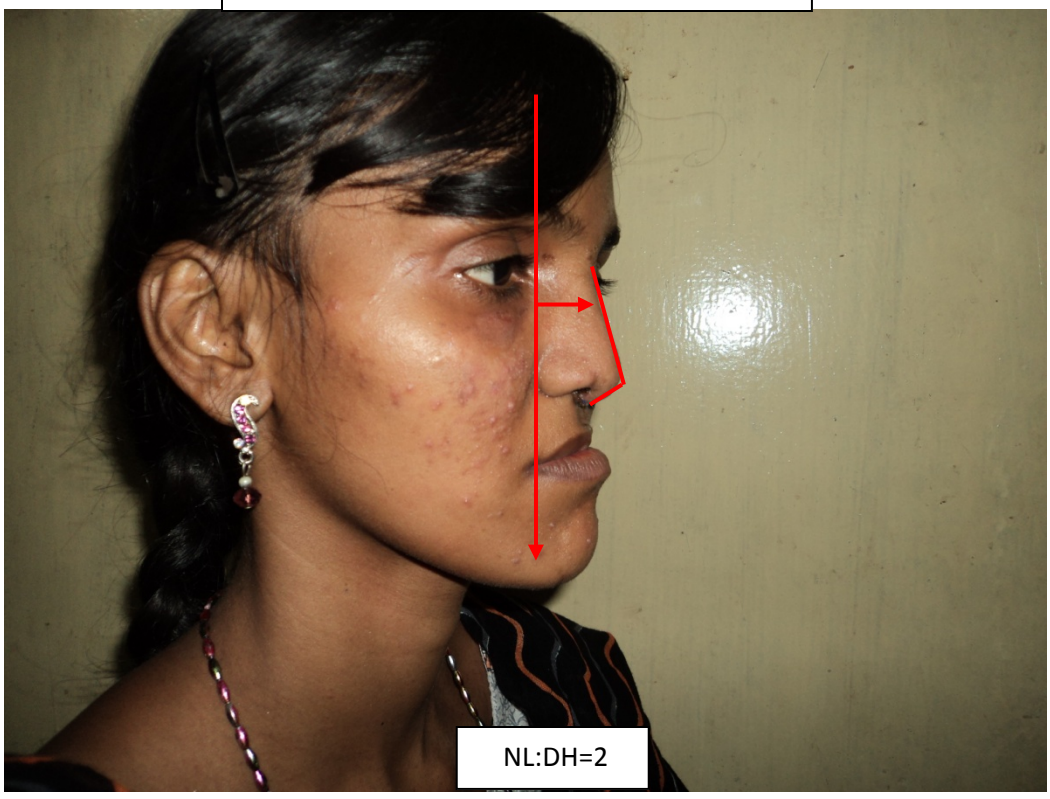

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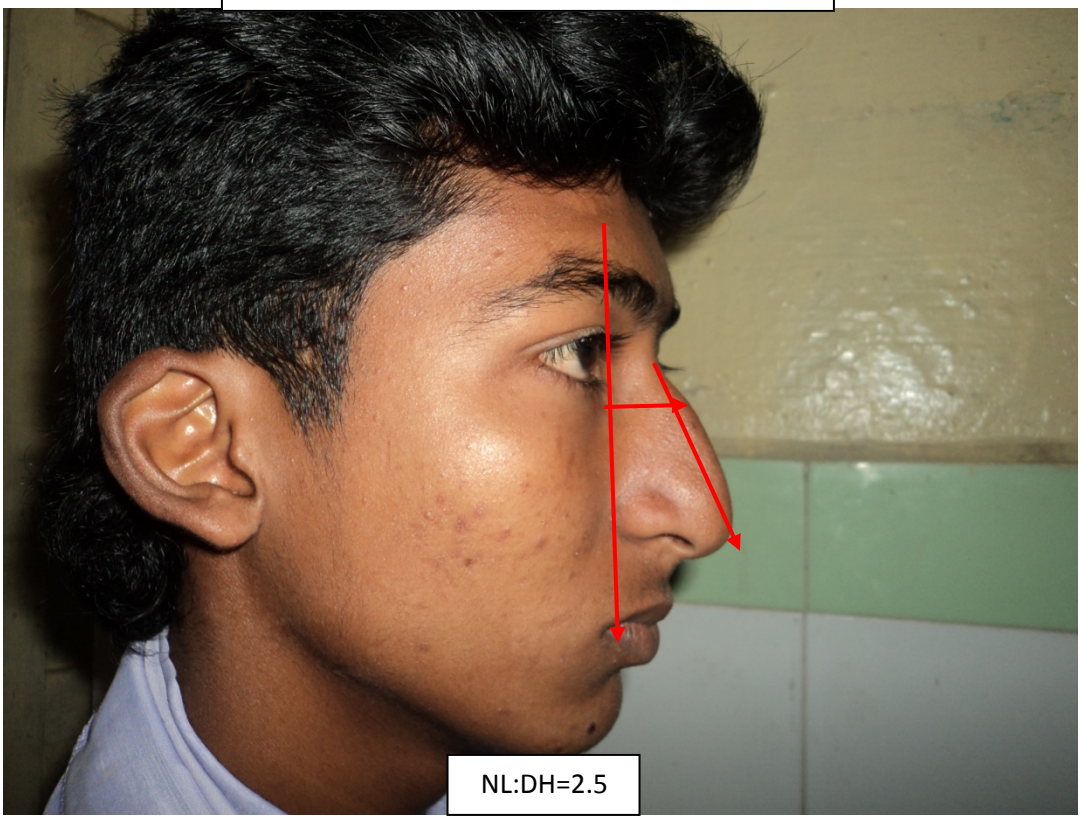

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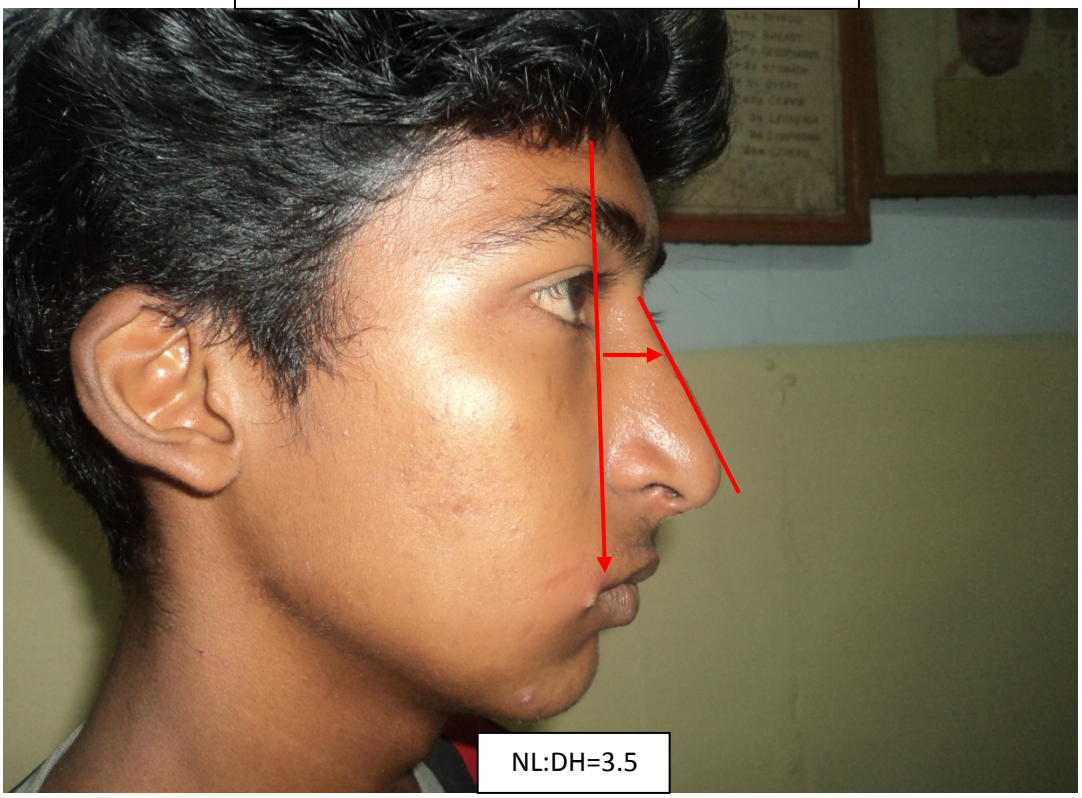

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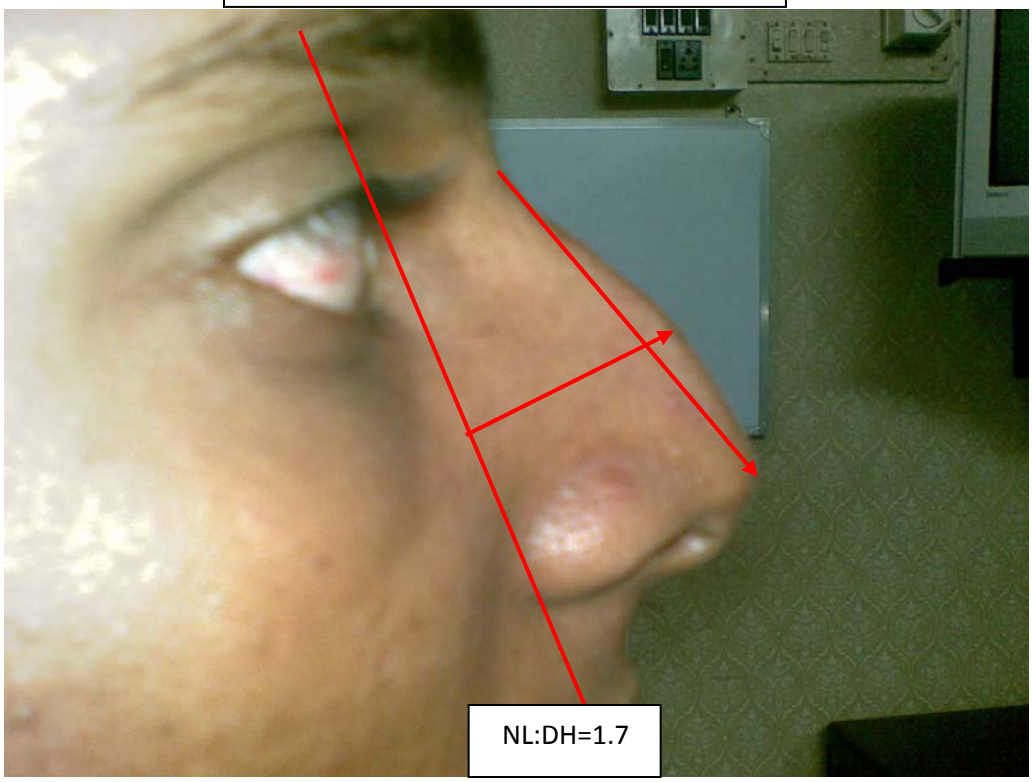

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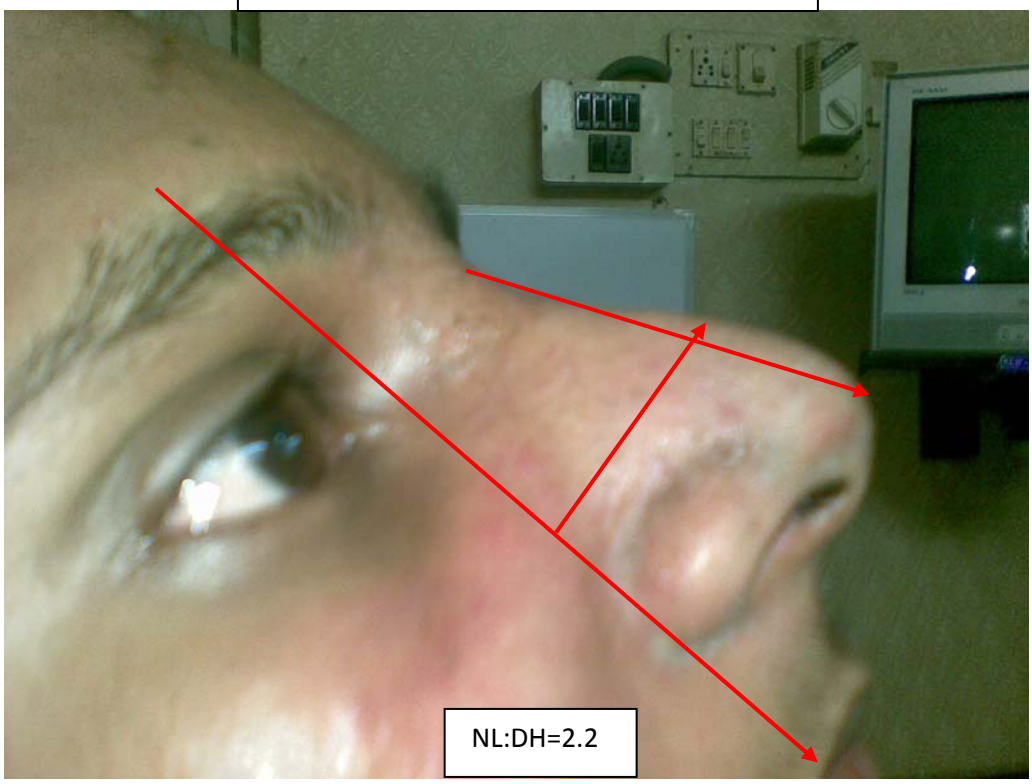

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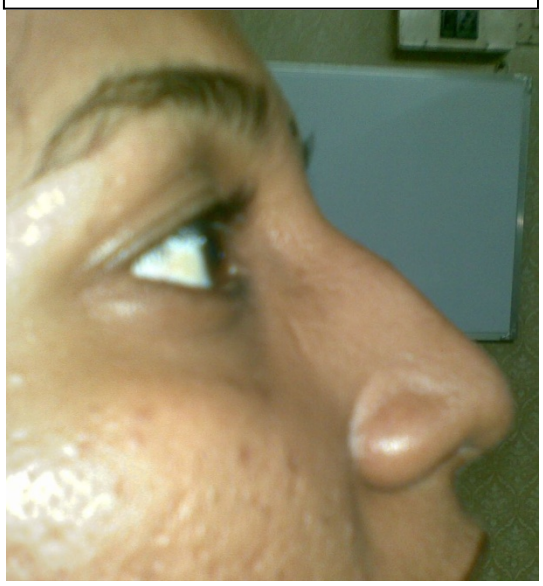

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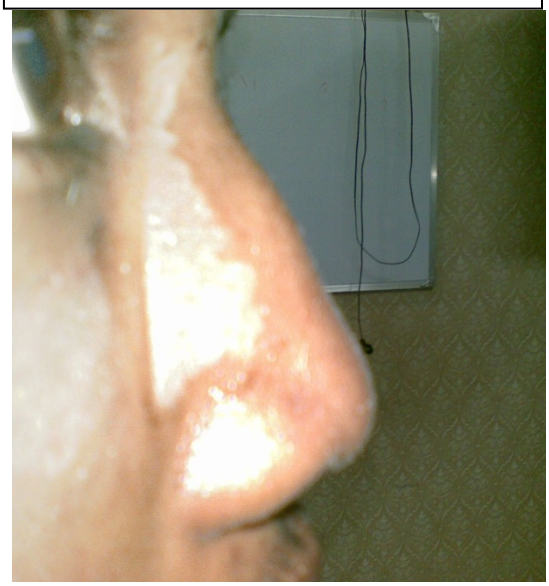

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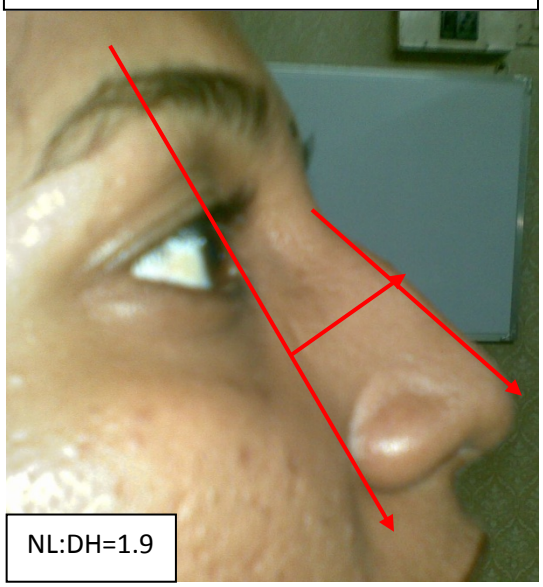

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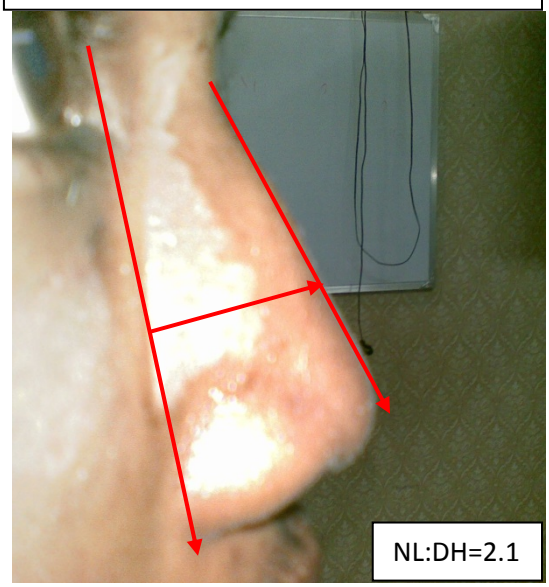

ANALYSIS & RESULTS

AGE DISTRIBUTION

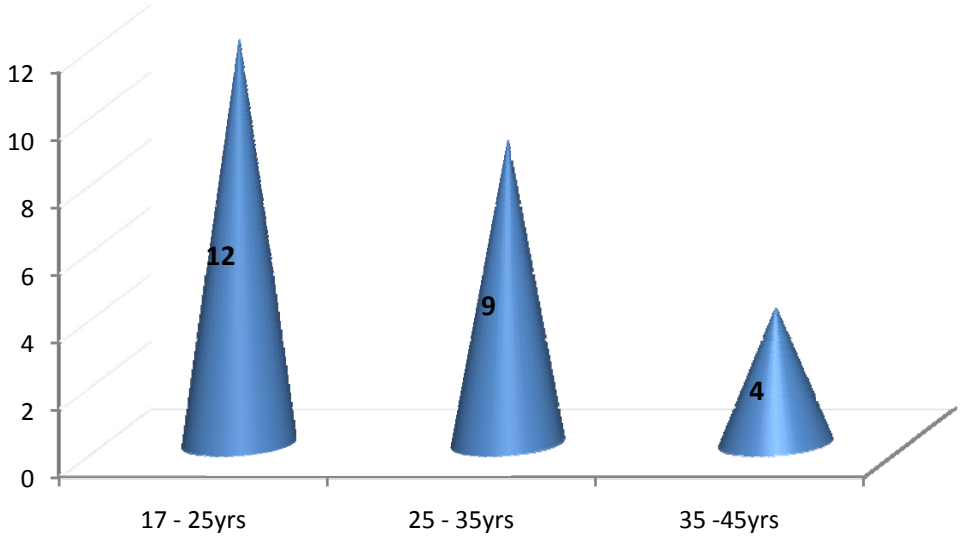

Figure 5

X – Age in years Y – Number of patients

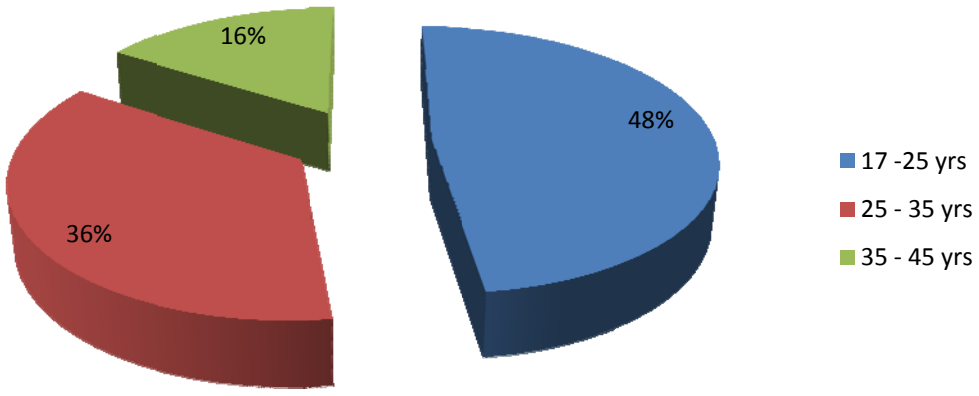

Figure 6

SEX DISTRIBUTION

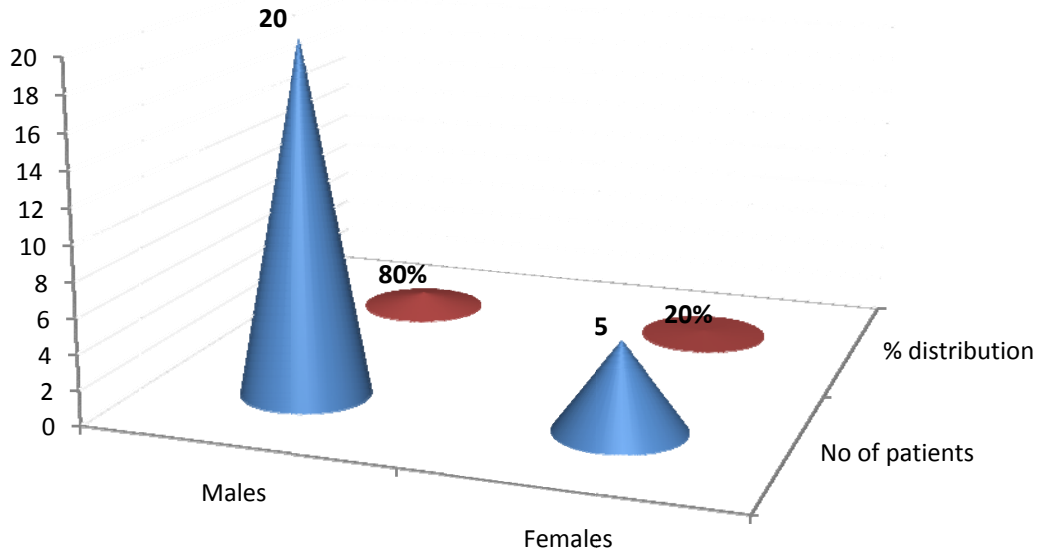

Figure 7

DEFORMITY DISTRIBUTION

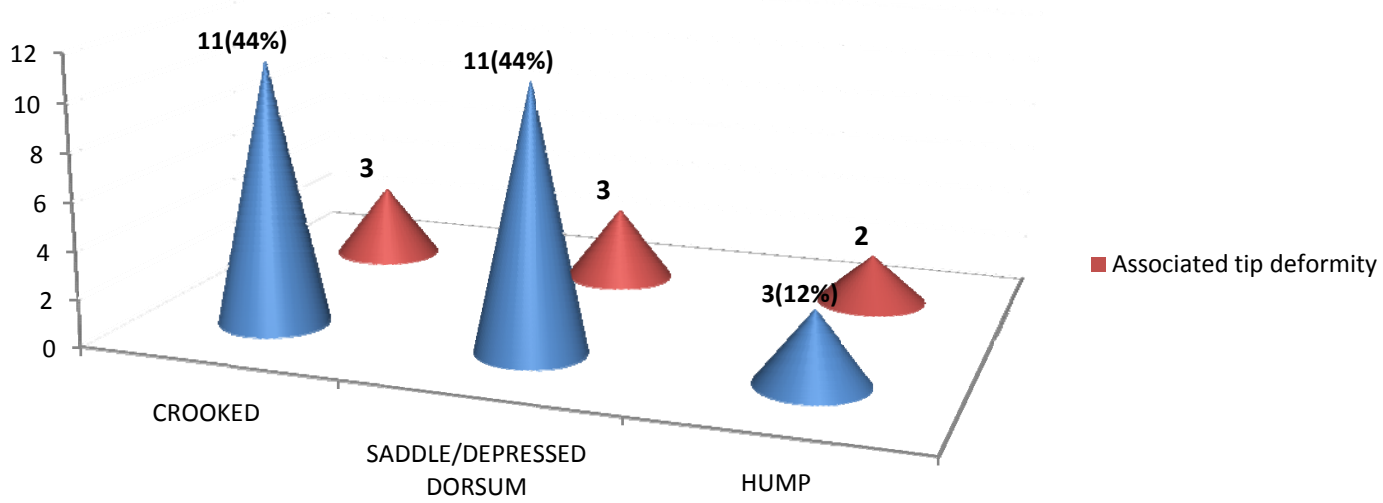

Figure 8

AETIOLOGY PROFILE

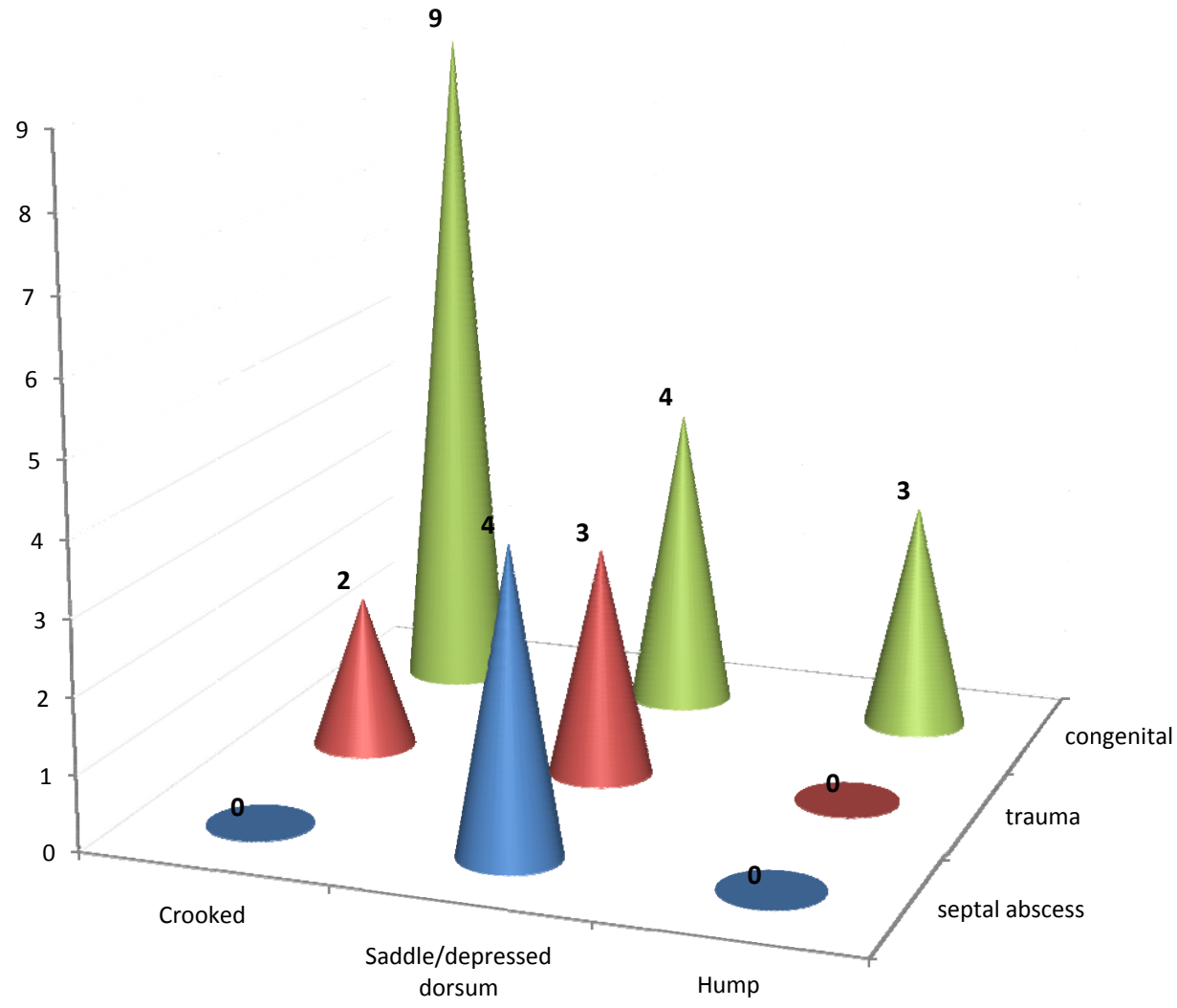

Figure 9

CROOKED NOSE:

Table 1

Pt.no	Pre-operative angle	Post-operative angle	% Corrected	Outcome
1.	152	176	85.7	Good
2.	135	177	93.3	Excellent
3.	160	177	85	Good
4.	171	174	33.3	Poor
5.	160	179	95	Excellent
6.	138	178	95.2	Excellent
7.	158	179	95.4	Excellent
8.	157	176	86.9	Good
9.	151	176	86.2	Good
10.	147	174	90.9	Excellent
11.	140	173	82.5	Good

Table 2

PTS	EXCELLENT	GOOD	FAIR	POOR
n	5	5	nil	1
%	45.5	45.5	Nil	9

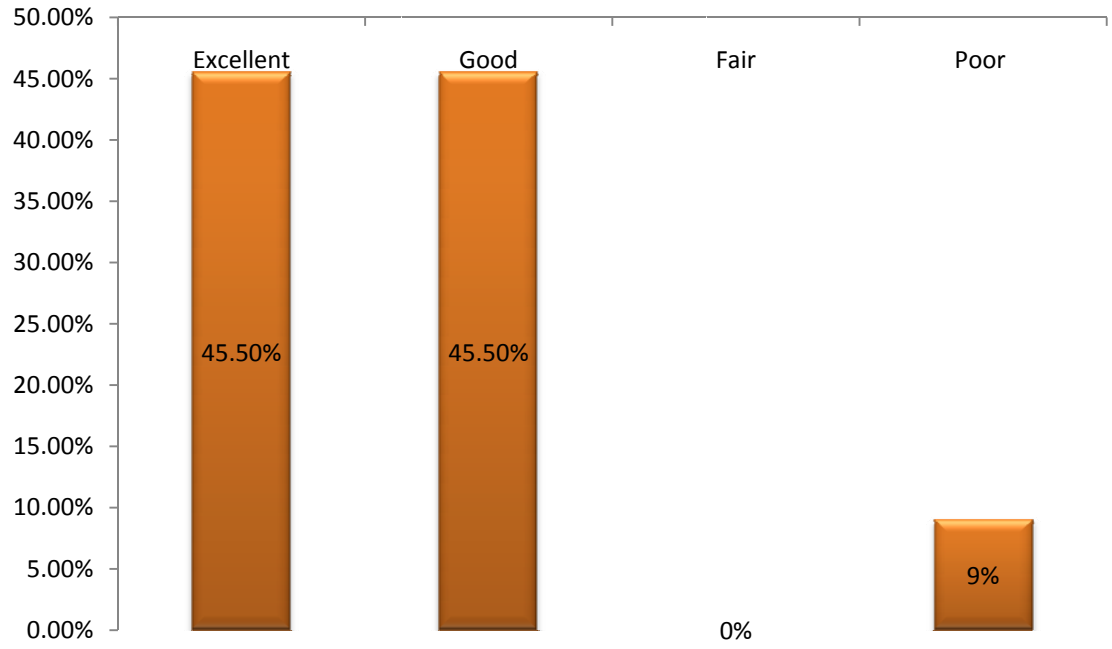

Figure 10

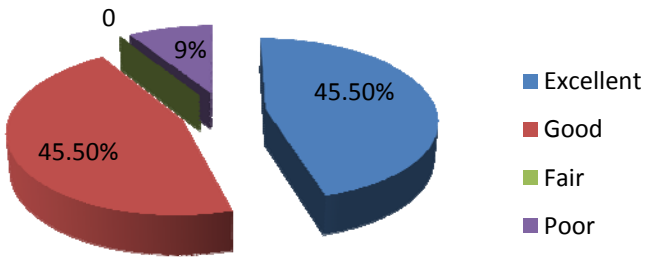

Figure 11

SADDLE NOSE:

Table 3

NO	Pre op NL to DH ratio	Desired NL to DH ratio	Post op NL to DH ratio	Degree of correction %	Outcome
1.	5.75	3.3	3.83	78	Good
2.	2.08	1.86	2	33	Poor
3.	4.89	3.38	3.57	87	Good
4.	2.32	2	2	100	Excellent
5.	2.89	1.18	2	52	Fair
6.	9	2.7	2.7	100	Excellent
7.	11.25	5.6	5.75	97	Excellent
8.	1.54	1.38	1.43	68.8	Fair
9.	2.1	1.9	1.9	100	Excellent
10.	2	1.78	1.78	100	Excellent
11.	2.13	1.7	1.7	100	Excellent

NL- nasal length ; DH- dorsal height at the level of maximum concavity

Table 4

	Excellent	Good	Fair	Poor
n	6	2	2	1
%	54.5	18.2	18.2	9.1

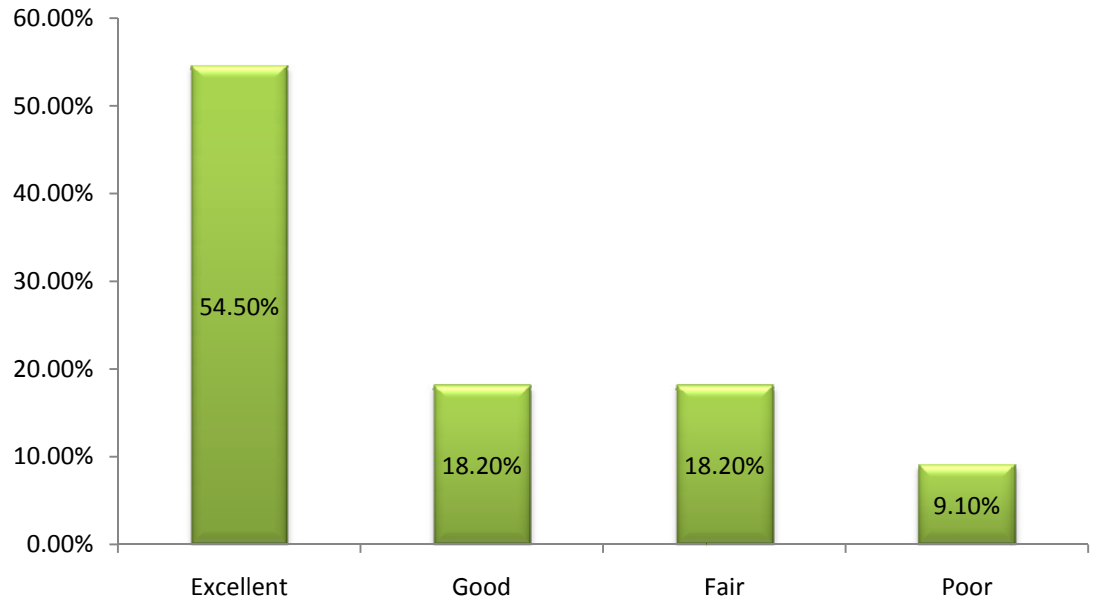

Figure 12

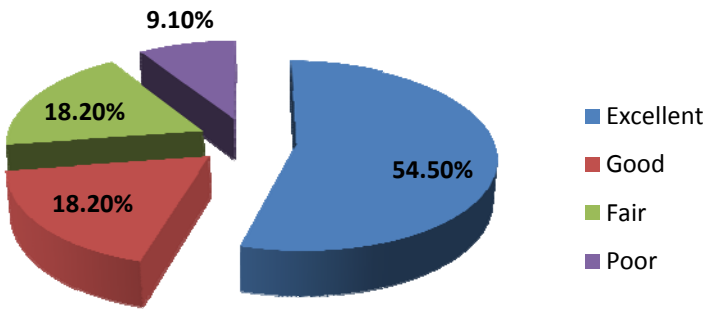

Figure 13

HUMP NOSE:

Table 5

No	Pre op NL to DH ratio	Desired NL to DH ratio	Post op NL to DH ratio	Degree of correction	Outcome
1.	2.5	3.5	3.5	100%	Excellent
2.	1.7	2.4	2.2	71%	Good
3.	1.9	2.1	2.1	100%	Excellent

Table 6

	Excellent	Good	Fair	Poor
N	2	1	nil	nil
%	66.6%	33.3%	nil	nil

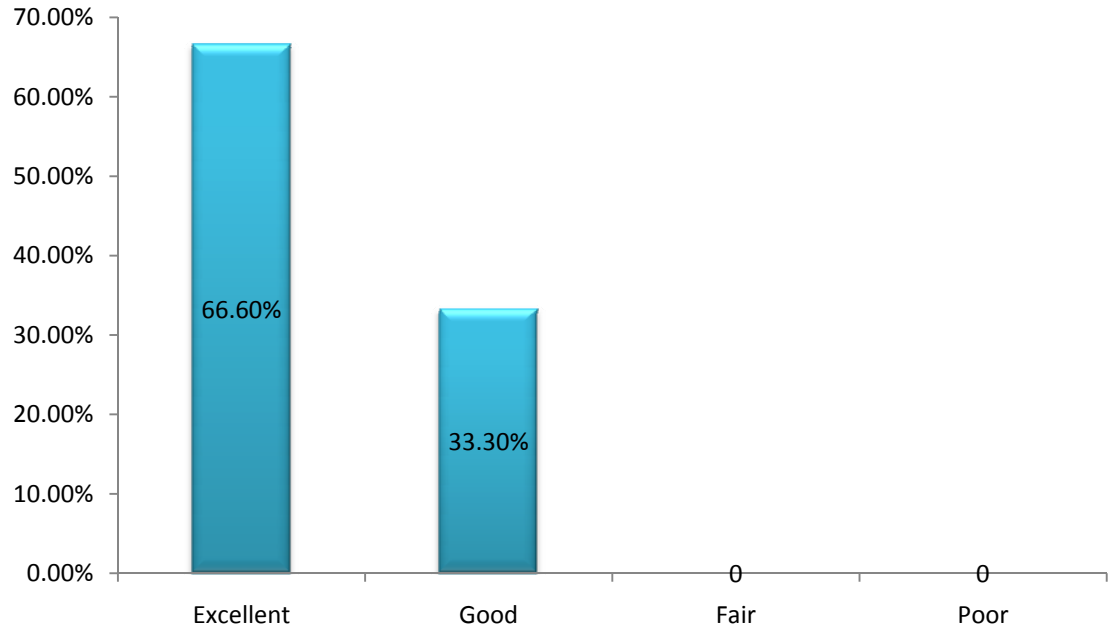

Figure 14

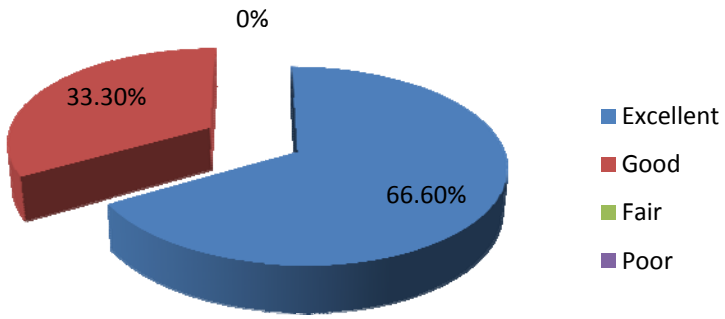

Figure 15

POSTOPERATIVE COMPLICATIONS

Table 7

Complications	No. of patients
Periorbital edema	8
Nasal obstruction	4
Graft rejection	Nil
Aesthetic	Nil
Others	Nil

DISCUSSION

This is a prospective study on Closed type of Rhinoplasty techniques in a series of 25 patients with various external nasal deformities of various aetiology.

AGE DISTRIBUTION:

We have selected patients of age group 17 to 45 years.

Among them 12 were within 17 to 25yrs ie.48%; 9 were within 25 to 35 yrs ie.36%; and 4 were within 35 to 45 yrs ie.16%.

Thus the individuals of age group 17 to 25 are commonly seeking for aesthetic correction of nasal deformities.

SEX DISTRIBUTION:

Out of our 25 patients 20 were males ie.80% and 5 were females ie.20%.

DEFORMITIES:

The most common type of deformity that we have encountered were Crooked nose & Saddle nose/ depressed dorsum. About 11 patients were having crroked nose ie.44%. Another 11 patients ie.44% were having saddle nose. And 3 were having a hump ie.12%.

3 of the 11 patients with crooked nose were having associated Tip deformity ie.27.2%. 3 of the patients with saddle nose have associated Tip

deformity ie.27.2%. 2 of the patients with hump were associated with Tip deformity.

Among the 25, 2 were having a bifid tip; 3 had underprojected tip; and 3 had a bulbous tip.

AETIOLOGY:

The most common aetiology was congenital. It was congenital in 16 patients ie.64% , posttraumatic in 5 patients ie.20% & post septal abscess in 4 patients ie.16%.

2 of the 11 patients with crooked nose were of traumatic aetiology ie.18.2%; 3 of the 11 patients with saddle nose were of traumatic origin ie.27.3%. 4 of the 11 patients with saddle nose were after an incidence of septal abscess ie.36.4%.

Thus the commonest aetiology for any nasal deformity is congenital . The commonest deformity that need rhinoplasty after trauma is a saddle nose.

OUTCOME:

Crooked nose:

The outcome in our series is excellent in about 45.5% of patients, good in 45.5% , bad in 9 % of patients. The only patient who had poor outcome was having an I shaped crooked nose.

This is a better outcome compared to a similar study conducted by Tanner Erdem & Orham Ozturan in which the results were excellent in 27.7%, good in 30.5%, moderate in 22.2% & bad in 19.4%.(Rhinology 2008 ,46.Pge 56 to 61)

Saddle nose:

In our series we have used Autogenous iliac crest bone graft in 7 patients & conchal cartilage graft in 4 patients.

The results were excellent in 54.5%, good in 18.2%, fair in18.2% & poor in 9.1%.

To specify the results were excellent in 3 of the 4 patients in whom cartilage graft were used ie.75%, Among the other 7 patients with bone graft 3 were having excellent results ie.42.8%.

The overall success rate with conchal cartilage graft was 92.2% & with iliac crest bone graft it was about 78.1%.

In a study conducted by Muhamed Saeed & Farooq the success rate with conchal cartilage was 100% and with iliac crest bone graft was 90%.

In another study by Murrel & George the success rate with conchal cartilage was 100%.

In a study conducted by Goodman & Gilbert the success rate with iliac crest bone graft was 92%. (Professional med journal. September 2006,vol:13.

Hump nose:

The results in hump nose were excellent in 2/3 patients and good in 1/3 patients.

NEED FOR A COMBINED APPROACH:

8 patients of our series were having associated tip deformities & we have corrected them by an open approach by using mid columellar V shaped incision after correcting the dorsum by endonasal approach.

Dr. Sam Rizk has pioneered this combined approach with good results. (Operative techniques in Otolaryngology , Head & Neck surgery , vol:18 issue 3,September 2007 ,pge 233 to 242)

COMPLICATIONS:

We did'nt encountered any major complication .

About 8 of our patients developed Periorbital edema in the postoperative period which recovered within an average of 2 days.

Another 4 patients complained of nasal obstruction & these patients had the same even before surgery.

CONCLUSION

This comprehensive study on Closed Rhinoplasty was conducted in Department of ENT , Government Rajaji Hospital , Madurai during August 2009 to September 2011.

This study consists of a detailed history, preoperative Aesthetic analysis, surgical correction & Postoperative Aesthetic analysis of 25 patients.

The goal of surgical correction is to give a good subjective & objective aesthetic perception to the patient without altering the nasal function.

The closed type of Rhinoplasty has given good results equivalent to the open approach.

In addition the patients are psychologically satisfied by avoiding external scars.

The factors that favoured our better results were a proper work up & planning, expert's hands, good aesthetic sense of the surgeon & a regular follow up by patients.

ENT surgeons are sculptors by Rhinoplasty & thereby changing not only the face but also the overall outlook of an individual.

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PROFORMA

COMPREHENSIVE STUDY ON CLOSED RHINOPLASTY

PATIENT DETAILS:

NAME :

AGE / SEX :

ADDRESS :

CONTACT NO :

OCCUPATION :

DOA / IP.NO :

HISTORY:

NASAL ILLNESS :

TRAUMA :

PREVIOUS SURGERY :

RESPIRATORY PROBLEMS :

CARDIOVASCULAR PROBLEMS:

BLEEDING DISORDERS :

EMOTIONAL /PSYCHOLOGICAL PROBLEMS:

GENERAL EXAMINATION:

GENERAL CONDITION:

CVS :

RS :

OTOLARYNGOLOGICAL EXAMINATION:

EAR :

THROAT :

ANATOMICAL EXAMINATION:

DORSUM:

Radix :

Height:

Width:

Other:

BASE:

Columella:

Alar flare:

Interalar width:

Other:

TIP:

Projection:

Domes :

Other :

INTERNAL:

Internal valve:

Septum :

Turbinate :

Other :

MISCELLANEOUS:

Maxilla :

Occlusion :

Chin :

Other :

RADILOGICAL INVESTIGATION:

CT Facial bones & PNS

ANALYSIS OF PREOPERATIVE PHOTOGRAPHS:

FRONTAL VIEW:

Nasal width:

Orientation of dorsum:

Position of tip:

Nostril show:

Nasolabial angle:

Alar width:

Lobule:

LATERAL VIEW:

Nasofrontal angle:

Nasofacial angle:

Nasolabial angle:

Nasal length:

Tip projection:

Dorsal height:

Columellar show:

BASAL VIEW:

Columella :

Position of tip:

Nature of tip:

Triangle :

Lobule:

DEFORMITY SPECIFIC ANALYSIS:

Crooked nose:

Angle of the deviated dorsum:

Saddle nose:

Ratio of nasal length to the height of dorsum from the line of facial plane.

Hump nose:

Ratio of nasal length to the height of dorsum from the line of facial plane.

SURGICAL NOTES:

Date :

Anaesthesia:

Surgeon :

Assistants :

Incision :

Septal correction:

Osteotomies :

Hump removal:

Cartilage / bone:

Rasping:

Augmentation:

Graft :

Tip :

POST OPERATIVE COURSE:

Complications if any:

Day of pack removal:

Day of splint removal:

POST OPERATIVE ANALYSIS:

Crooked nose:

Angle of the dorsum:

Saddle nose:

Nasal length to dorsal height ratio:

Hump nose:

Nasal length to dorsal height ratio:

MASTER CHART

S. No	NAME	IP No.	A/S	DOA	DOS	DOD	Deformity	Etiology	ASS. Tip deformity	Surgery	Result	complications
1.	Sornapriya	63124	22/F	23|8|10	24|8|10	31|8|10	C	Co	-	SR	E	POE
2.	Arumugam	70128	28/M	8|9|10	9|9|10	16|9|10	C	T	-	SR	G	NO
3.	Balaji	75537	36/M	11|10|10	12|10|10	20|10|10	C	Co	-	SR	P	NO
4.	Manikandan	76048	28/M	13|10|10	14|10|10	21|10|10	C	Co	B	SR+TP	E	nil
5.	Rajapandi	81634	19/M	8|11|10	9|11|10	17|11|10	C	Co	B	SR+TP	G	POE
6.	Jeeva	83337	22/M	15|11|10	16|11|10	25|11|10	C	T	-	SR	G	Nil
7.	Nagumiran	86952	19/M	1|12|10	2|12|10	10|12|10	C	Co	-	SR	E	Nil
8.	Praveen	01431	30/M	7|1|11	8|1|11	16|1|11	C	Co	-	SR	G	Nil
9.	Pragadeswar	08369	21/M	7|2|11	8|2|11	14|2|11	C	Co	-	SR	G	Nil
10.	Saravanan	15299	19/M	9|3|11	10|3|11	18|3|11	C	Co	B	SR+TP	G	POE
11.	Asan Banu	37758	26/F	15|6|11	16|6|11	23|6|11	C	Co	-	SR	E	Nil
12.	Anbarasu	82741	30/M	22|10|10	23|10|10	30|10|10	S	T	-	AR	E	POE
13.	Selvan	79186	18/M	27|10|10	28|10|10	5|11|10	S	A	-	AR	E	POE
14.	Pandi	85542	44/M	24|11|10	25|11|10	4|12|10	S	A	-	AR	E	Nil
15.	Kaja Maideen	19619	18/M	21|3|11	22|3|11	30|3|11	S	A	-	AR	E	Nil
16.	Rani	23449	28/F	15|4|11	16|4|11	24|4|11	S	Co	-	AR	P	Nil
17.	Nasreen banu	29517	26/F	11|5|11	12|5|11	21|5|11	S	Co	BI	AR+TP	F	Nil
18.	SenthilKumar	38816	30/M	20|6|11	21|6|11	29|6|11	S	Co	-	AR	G	Nil
19.	Johnson	48191	22/M	29|7|11	30|7|11	7|8|11	S	T	BI	AR+TP	F	POE
20.	Ponnaiah	53418	38/M	22|8|11	23|8|11	31|8|11	S	T	-	AR	E	POE
21.	Kousalya	53951	22/F	24|8|11	25|8|11	3|9|11	S	Co	U	AR+TP	G	NO
22.	Kalimuthu	55858	40/M	2|9|11	3|9|11	10|9|11	S	A	-	AR	E	POE
23.	Selvakumar	07428	22/M	11|10|10	12|10|10	18|10|10	H	Co	U	RR+TP	E	Nil
24.	Karuppu	86957	25/M	1|12|10	2|12|10	10|12|10	H	Co	U	RR+TP	G	NO
25.	Sekar	00931	28/M	5|1|11	6|1|11	12|1|11	H	Co	-	RR	E	Nil

KEY FOR MASTER CHART

DOA – DATE OF ADMISSION
DOS – DATE OF SURGERY
DOD – DATE OF DISCHARGE
C - CROOKED NOSE
S - SADDLE NOSE
H - HUMP NOSE
Co - CONGENITAL
T - TRAUMATIC
A - ABSCESS
U - UNDERPROJECTED TIP
BI - BIFID TIP
B - BULBOUS TIP
SR - SEPTORHINOPLASTY
TP - TIP PLASTY
AR – AUGMENTATION RHINOPLASTY
RR – REDUCTION RHINOPLASTY
E - EXCELLENT
G - GOOD
F - FAIR
P - POOR
POE- PERIORBITAL EDEMA
NO – NASAL OBSTRUCTION